Ferruginous Hawk (*Buteo regalis*) Inventories on the Dillon Resource Area of Southwest Montana; 1992

by

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ABSTRACT

From June to August 1992, 42,890 ha of public and private land were surveyed in Beaverhead and Madison counties of southwest Montana for the presence of Ferruginous Hawks. Fifty nests were located, including 16 active nests (15 previously undocumented territories). With the addition of these active nests, the surveyed areas of southwestern Montana contain at least 132 active territories. Hawks chose a variety of substrates upon which to nest, primarily placing nests upon rocky outcrops (51.6%) in this high elevation population ($\bar{x}$ = 1888 $\pm$ 178.5 m). Nests were located near the apexes (65.39 $\pm$ 17.87%) of steep slopes (62.76 $\pm$ 40.15%) which predominantly exhibited a southern exposure (190.84 $\pm$ 62.45°). Habitat within 100 m of Ferruginous Hawk nests consisted of approximately equivalent proportions of grassland and shrubland, whereas grassland constituted over 50% of the vegetation within a 1.6 km circle centered at the nest. On average, territories contained 1.31 $\pm$ 0.92 alternate nests and active territories were separated by a mean of 1911 m (SD = 659.2 m). Density of breeding Ferruginous Hawks was highly variable throughout the study area ranging from 0 to 0.10 active territories per square kilometer ($\bar{x}$ = 0.04 $\pm$ 0.04 active territories/km^2). Fifty percent of the active and inactive nests were observed in the Sagebrush Steppe Association, whereas the Foothill Prairie Association contained 43.8 and 23.5% of the active

and inactive nests, respectively. Only 6.3 and 2% of the active and inactive nests, respectively, were located in the Mountain Mahogany Association. Productivity of Ferruginous Hawk nests was 1.9 $\pm$ 1.4 fledglings/territorial pair. Ground squirrels (Spermophilus spp.) accounted for 45.5% of identified prey items, whereas passerines made up nearly 20% of the diet of this population of Ferruginous Hawks. Vegetative diversity was measured surrounding 15 active nests from the Centennial Valley north to the Dillon area.

INTRODUCTION

The Ferruginous Hawk (Buteo regalis) is the largest buteo in North America and has been shown to be strongly associated with grasslands, and to a lesser extent, shrub steppe communities where open areas are available for foraging. Ferruginous Hawks historically nested over much of western North America (Figure 1). Many researchers have inferred or demonstrated that Ferruginous Hawk populations have declined through portions of their range and since 1982, this species has been classified as a Category 2 species by the United States Fish and Wildlife Service (USFWS) (Woffinden 1975, Oakleaf 1985, Powers and Craig 1976, Murphy 1978, Bechard 1981, Evans 1982, Houston and Bechard 1984, Schmutz 1984, Schmutz et al. 1984, Woffinden and Murphy 1989, USFWS 1992). In 1991, the USFWS was petitioned to list this species as "endangered" under the Endangered Species Act (Ure et al. 1991); a listing that was subsequently deemed unmerited due to the high variability within and between populations in terms of productivity and to the fact that the petition presented insufficient information to warrant such a listing (USFWS 1992) even though Ferruginous Hawks are currently considered a "threatened" species by the Canadian Wildlife Service (Johnsgard 1990). Much concern remains regarding the long-term viability of Ferruginous Hawks over much of their range.

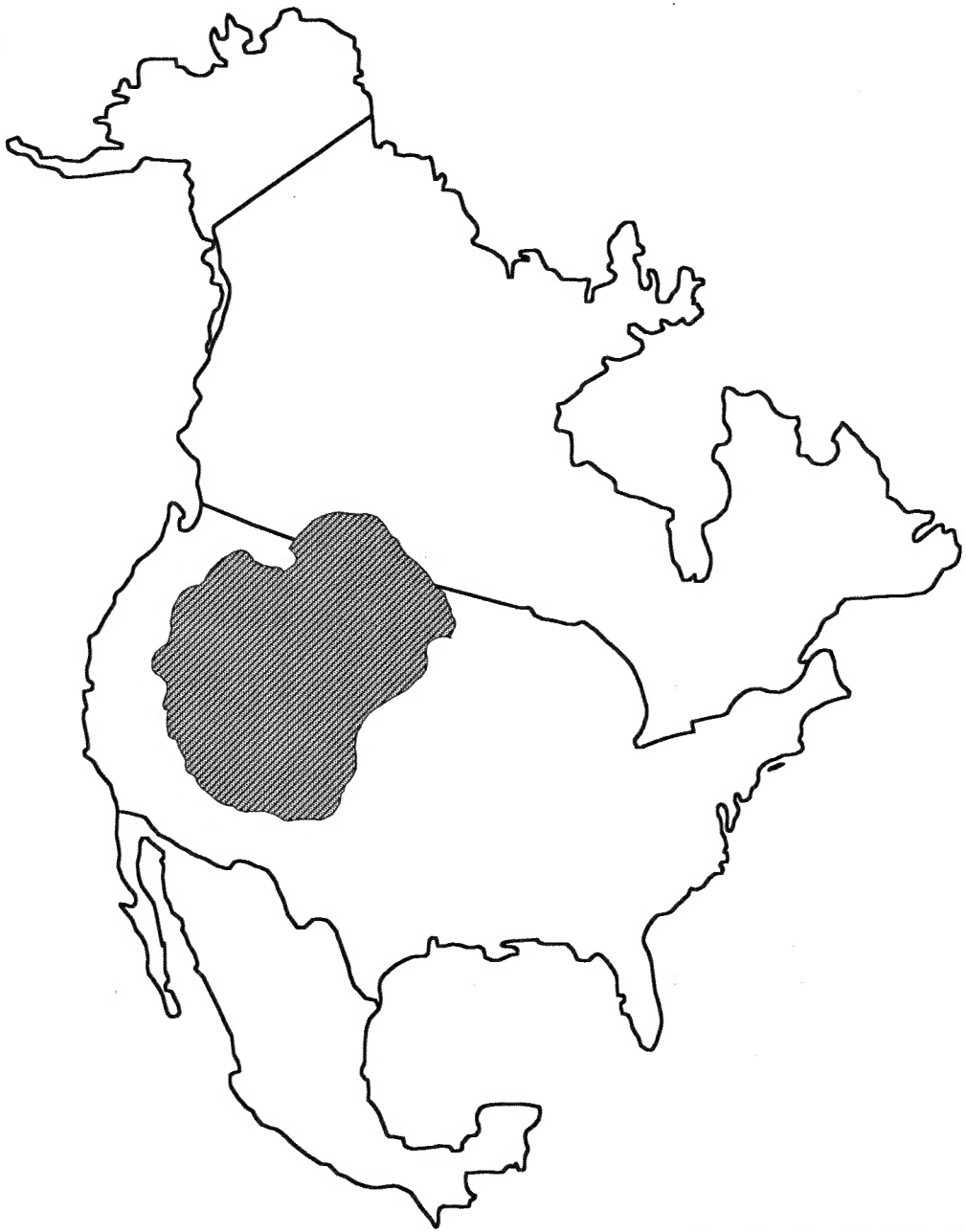

Figure 1. Historic breeding range of the Ferruginous Hawk in North America.

The state-wide status and viability of Ferruginous Hawks in Montana is poorly known with studies to date centered in extreme southeastern, extreme southwestern, and north-central Montana (Ensign 1983; Myers 1987; Restani 1989, 1991; Harmata 1991; Wittenhagen 1991). Montana appears to support a relatively stable population of breeding Ferruginous Hawks, second in size only to Wyoming in the United States (Ure et al. 1991, USFWS 1992). Myers (1987) documented a very high density of nesting pairs in Beaverhead and Madison counties, rivalled by few other populations region-wide. However, similar to other portions of its breeding range, apparently suitable habitat in southwestern Montana remains unoccupied by breeding Ferruginous Hawks (Fitzner et al. 1977, E. C. Atkinson pers. observ.) and the number of active territories has likely declined historically in Montana as a result of homesteading and the concurrent conversion of native grasslands to agriculture (Dennis Flath pers. comm.). Just to our north in Alberta, Ferruginous Hawks presently occupy only 60% of the area in which they historically nested, a situation that is strongly tied to increases in land area used for agriculture and the increases of woody species associated with fire suppression (Houston and Bechard 1984; Schmutz 1984, 1987a).

This study was a continuation of the surveys of public land in southwest Montana performed in 1985 and 1986 by

Lewis Myers [Bureau of Land Management (BLM), Dillon Resource Area]. The surveys that I performed in 1992 led to the completion of an inventory program for the majority of BLM holdings in Beaverhead and Madison counties, Montana (Figure 2).

METHODS

I initiated field surveys for nesting Ferruginous Hawks on 24 June 1992 and continued until 1 August 1992. Six major areas totalling 42,890 ha (105,900 acres) to be surveyed were delineated by Dillon Resource Area (BLM) biologist Jim Roscoe (Appendix A). Area boundaries were transferred to 7.5 minute U.S. Geological Survey (USGS) topographic maps for use in the field.

Surveys were conducted on foot by walking ridges while intermittently stopping to survey the surrounding areas for stick nests and hawks with 9X binoculars and/or 20X spotting scope. Additionally, some areas were surveyed via 4x4 truck, again, coupled with scanning through binoculars, often from exposed promontories. One aerial survey from a fixed-wing aircraft was performed on 16 July.

Locations of Ferruginous Hawk and other raptor nests were plotted on 7.5 minute quads and a "Raptor Nest Inventory" form (BLM) (Appendix B) was filled out for each Ferruginous Hawk nest observed. I categorized the substrate supporting the nest into the following: ground = nest

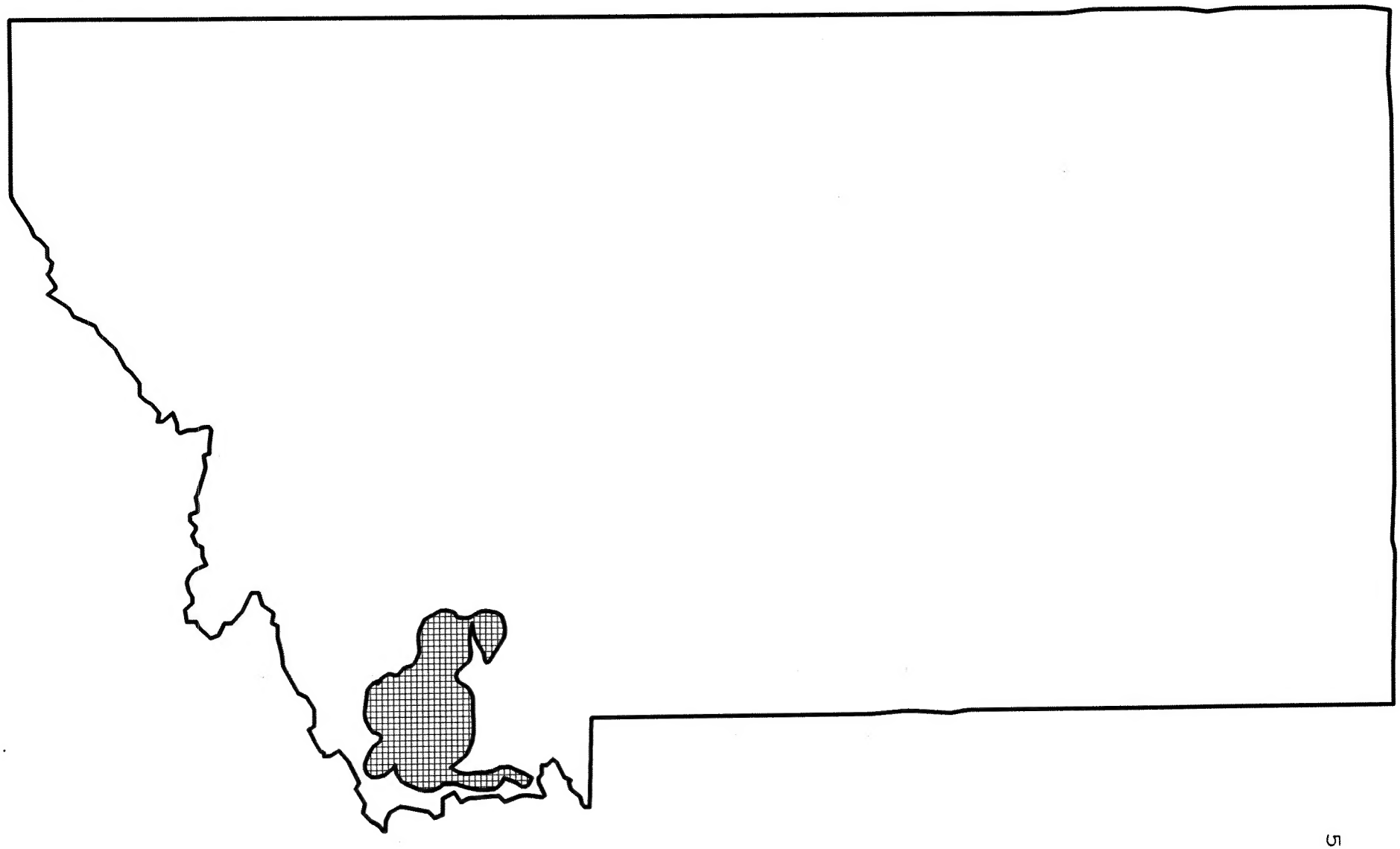

Figure 2. General location of the study area in southwest Montana.

situated directly (not elevated) upon the ground; outcrop = nest situated on a rocky outcrop, the size of which ranged from < 1m to several meters in height; rimrock or bluff = a linear escarpment or fault-line, smaller than a cliff and up to approximately 12m in height; cliff = less linear than rimrock and usually > 12m in height; tree = conifer or deciduous tree, or shrub; and power pole. The activity status of each nest was determined, number and approximate age of young were recorded, slope and aspect were measured, prey items were enumerated, and pellets were collected at each nest. Additionally, I visually estimated the percent cover and percent quantity of major vegetative cover types primarily including grassland, shrubland, and shrub/grass mosaic areas within a 100 m radius of the nest and within a 1.6 km (1 mile) radius of the nest. I determined the habitat association within which each nest occurred from maps located at the Dillon Resource Area office (Kuchler 1964).

Ferruginous Hawk pellets were dissected with a 10-30X dissection scope, prey items were identified, and prey were enumerated, corrected to the minimum number of individuals represented for each nest or collection date. Beetles (Carabidae and Scarabaidae) were treated as though they were incidentally ingested, hence, were not included in the analysis. Diet diversity was calculated for the complete study area (Ludwig and Reynolds 1988).

From 30 July to 1 August, botanical data surrounding 15 nests (active 1992) were recorded with the use of ECODATA methodology (Appendix C, DeVelice 1991). Shannon's index and Hill's numbers as measurements of diversity for plant species present within a 10.9 m radius surrounding each nest were calculated for each ECODATA plot (Ludwig and Reynolds 1988).

RESULTS

I found a total of 16 active Ferruginous Hawk nests while performing surveys. I also discovered 24 inactive nests over the course of the field season. Nests ranged in elevation from 1635 to 2286 m (5365 to 7500 feet) (x = 1887.8 m, SD = 178.5 m, n = 50). Legal descriptions of each nest with habitat associations are presented in Appendix D. Completed "Raptor Nest Inventory" forms are on file at the Dillon Resource Area office. Additionally, 11 active nests located in the Centennial Valley adjacent to our study area (Marco Restani, pers. comm.) were visited to record productivity and to describe nesting habitat. Locations of other raptor nests observed are listed in Appendix E.

Density of active territories was quite variable between the areas that were surveyed (Table 1). The two areas with highest Ferruginous Hawk breeding pair densities were the Frying Pan Basin and Diamond Butte areas, both of which contained a significant amount of private lands. The

Table 1. Areas surveyed, number of active territories, and densities of Ferruginous Hawks in southwest Montana.

AREA	# km^2	# ACTIVE TERRITORIES	km^2/ PAIR	#PAIRS /km^2
Armstead	77.7	0	----	0.00
Bannack	59.5	1	59.5	0.02
Block Mtn.	46.6	1	46.6	0.02
Diamond Butte	19.7	2	9.9	0.10
Frying Pan Basin	77.7	8	9.7	0.10
Henneberry	57.0	1	57.0	0.02
Sweetwater	44.1	1	44.1	0.02
Vinegar Basin	46.6	1	46.6	0.02
Total	428.9	15	28.6	0.04

average distance which separated active nests was 1911 m (SD = 659.15, n = 8) and I found that each active territory contained an average of 2.31 nests (including the active nest and any alternate nests) (SD = 1.92, n = 16). Eight territories contained the active nest only, whereas one territory contained seven alternate nests.

The single aerial survey proved to be quite efficient. During a period of two hours I located two Ferruginous Hawk nests in the approximately 7800 ha (19200 acres) surveyed. However, both nests were inactive. I subsequently surveyed the area on foot and by vehicle, discovering one additional inactive Ferruginous Hawk nest and an active Red-tailed Hawk nest from which young had recently fledged.

Ferruginous Hawks chose a variety of substrates for nesting, most commonly upon rocky outcrops (Figure 3). Other than those nests on cliffs or in trees, most were quite accessible from the ground, potentially accessible to ground predators. Nests were oriented nonrandomly with hawks preferring to orient their nests with a southern exposure [$\bar{x}$ = 190.84° , circular standard deviation = 76.94°, n = 48; Rayleigh's test, z = 7.91, $p < 0.0001$ (Zar 1974)] (Figure 4).

The slope upon which Ferruginous Hawks placed their nests was quite variable and the mean slope was quite high (x = 62.8%, SD = 40.2%, n = 50) (Figure 5). Most nests were

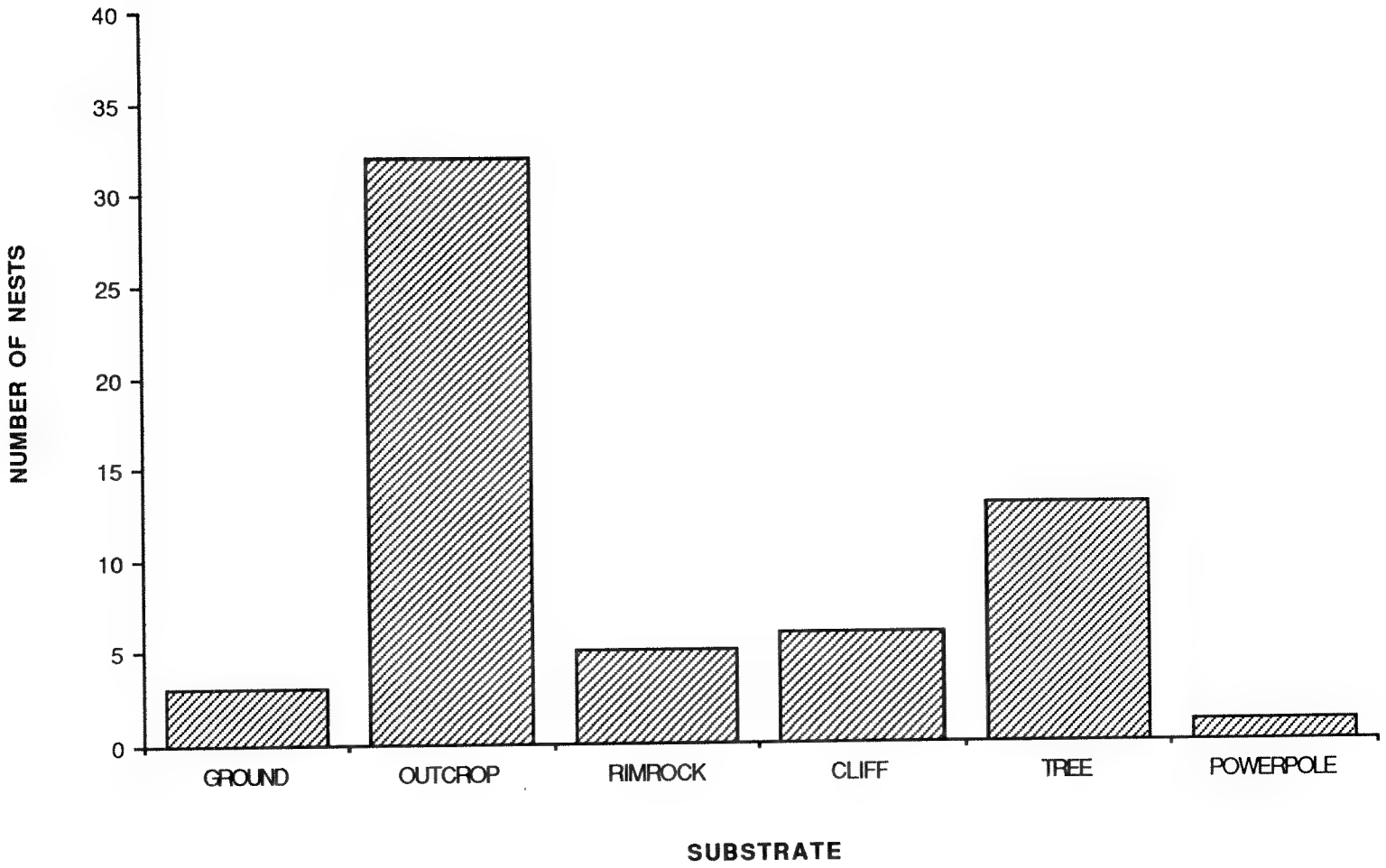

Figure 3. Substrates nested upon by Ferruginous Hawks in southwest Montana, 1992 (n = 60).

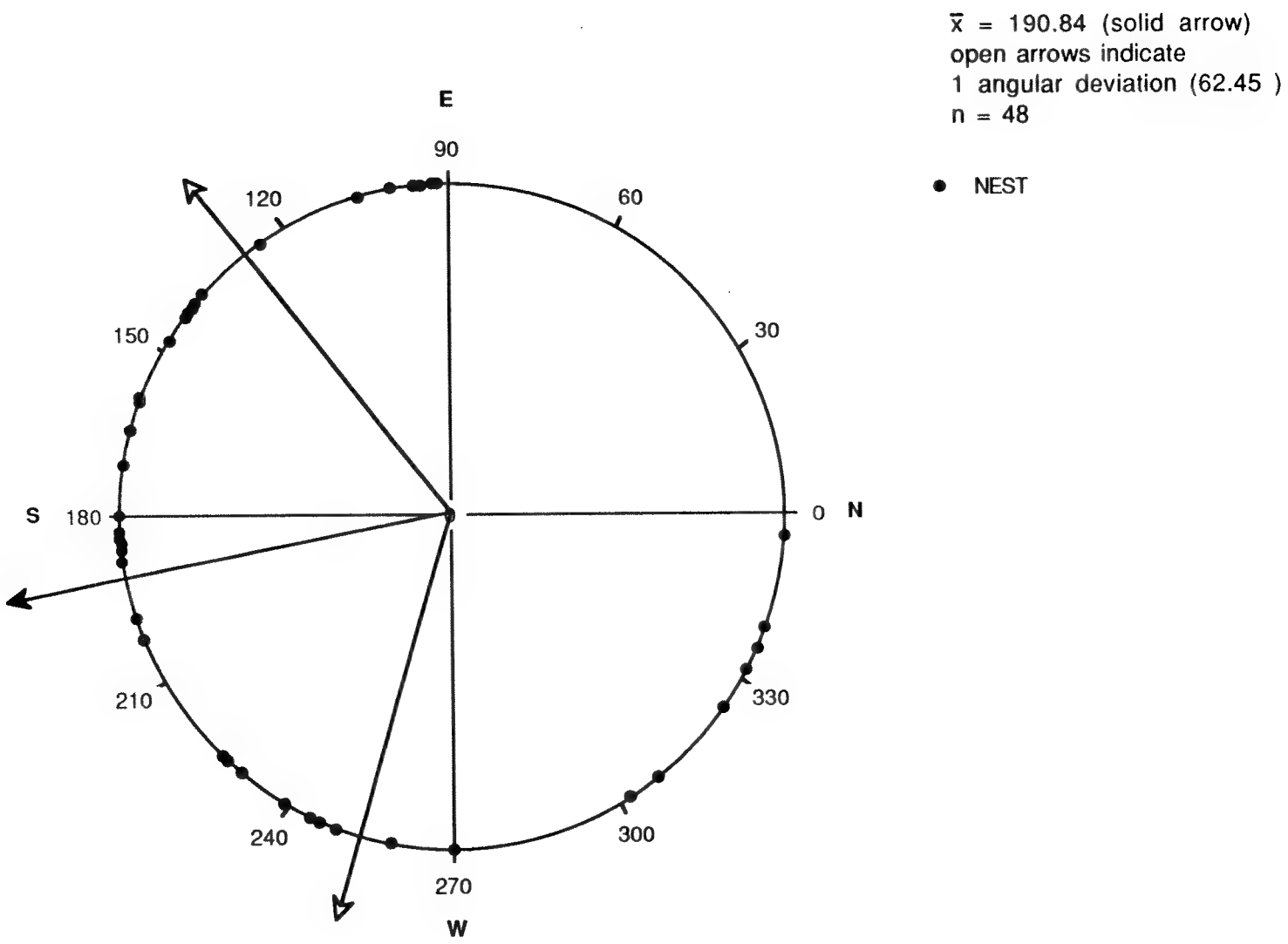

Figure 4. Orientation of Ferruginous Hawk nests in southwest Montana, 1992.

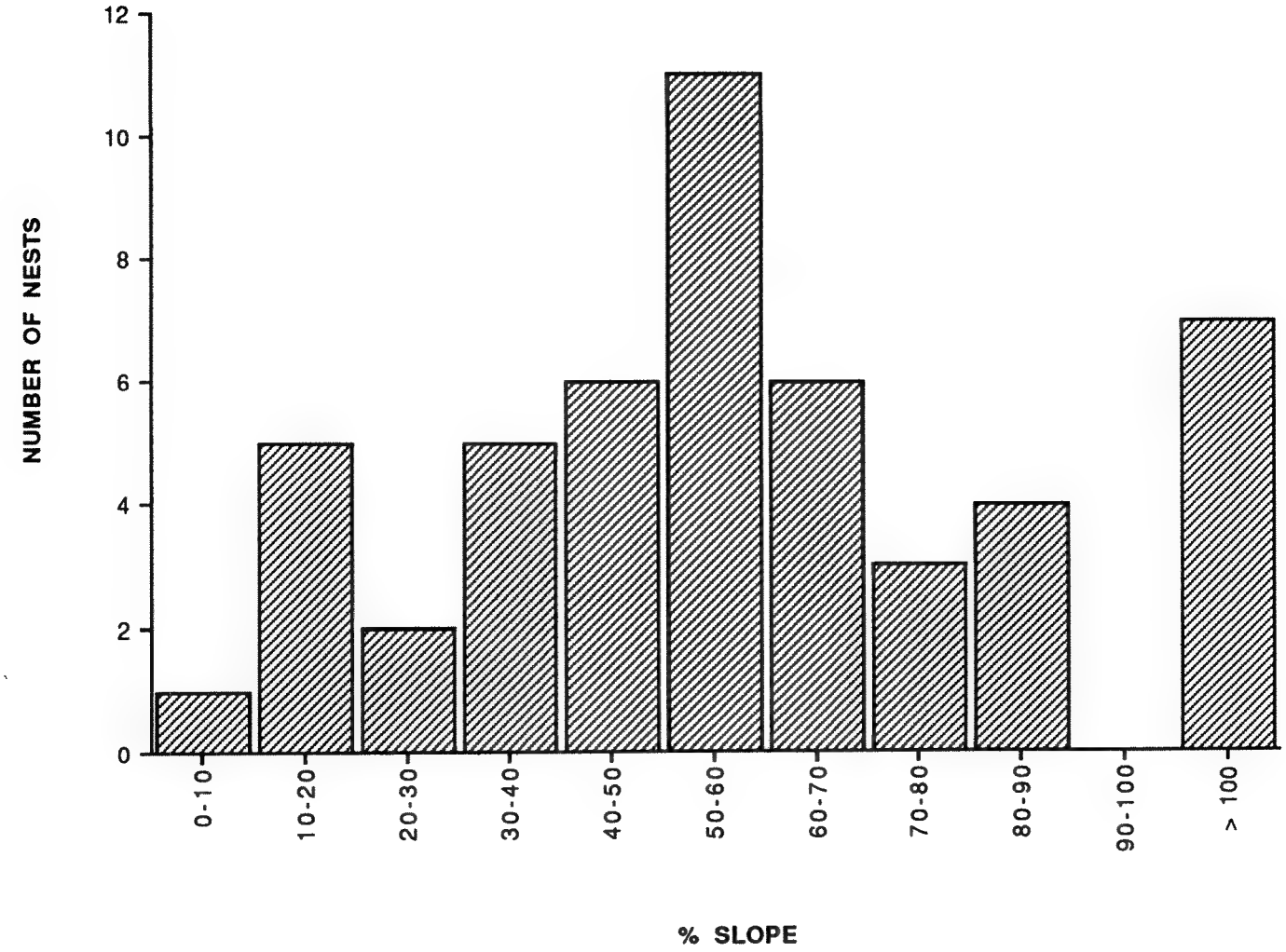

Figure 5. Slopes nested upon by Ferruginous Hawks in southwest Montana, 1992 (n = 50).

placed on the upper 35% of these relatively steep slopes (Figure 6).

Habitat surrounding 43 Ferruginous Hawk nests was largely composed of a mixture of grassland and shrubland. Within 100 m (300 ft) of the nest, the quantity of grassland and shrubland was approximately equivalent, whereas the majority of the area within 1.6 km (1 mile) was composed of grassland (Figure 7). However, most of the nests were found within the Sagebrush (Artemisia tridentata) Steppe Association (Kuchler 1964) (Figure 8).

Productivity of Ferruginous Hawks throughout the study area and the Centennial Valley was variable with 81.5% of nests fledging at least one young [$\bar{x}$ = 1.93 fledglings, SD = 1.38 fledglings, n = 27 (all active nests); $\bar{x}$ = 2.36 fledglings, SD = 1.14 fledglings, n = 22 (successful nests)] (Figure 9). The most common number of young fledged per nest was two. Five nests failed to fledge young, apparently due to a number of factors including removal of the nest from a power pole by utility workers (Scott Jackson, U.S. Fish and Wildlife Service, pers. comm.), predation by a corvid, possible shooting of a nestling, chilling of eggs in a nest near a salt lick, and failure to lay eggs by one pair.

Through identification of 87 prey items I determined that Ferruginous Hawks in the southwest Montana study area preyed primarily upon small rodents, especially ground

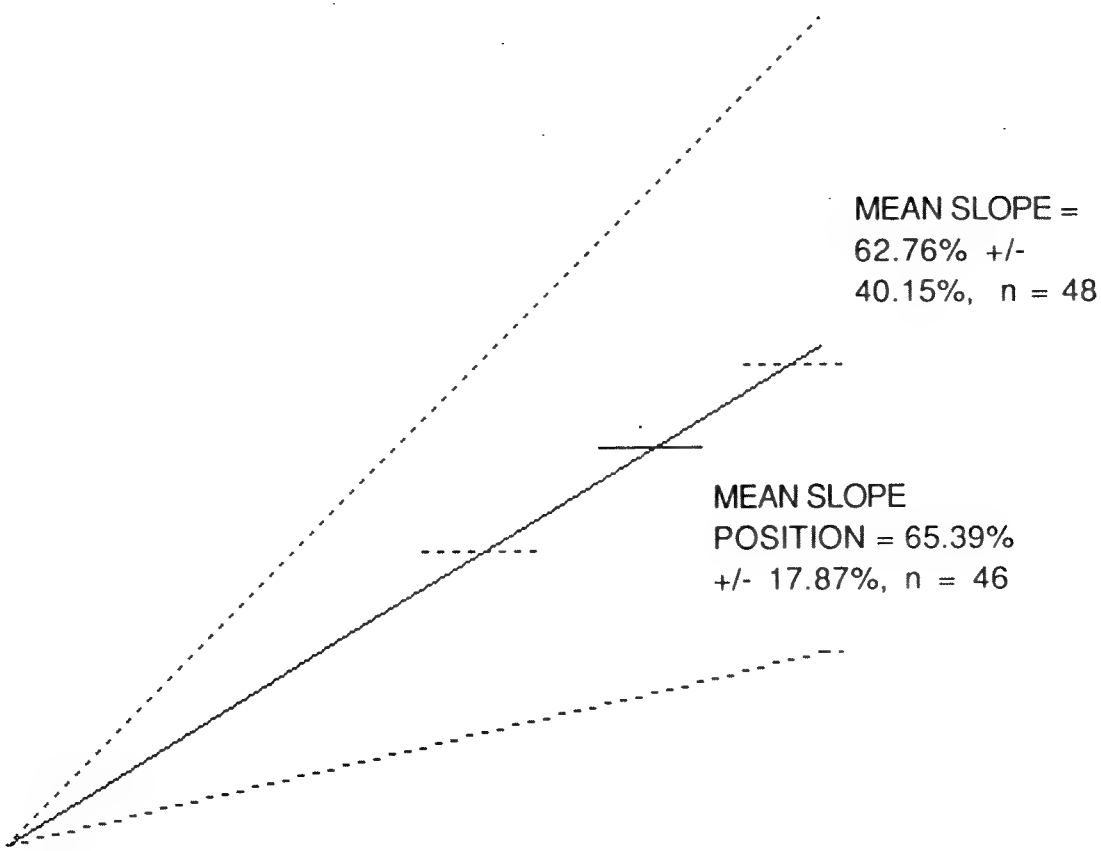

Figure 6. Slope gradient used for nesting and slope position of Ferruginous Hawk nests in southwest Montana, 1992 (n = 50). Solid lines denote means, dashed lines denote one standard deviation.

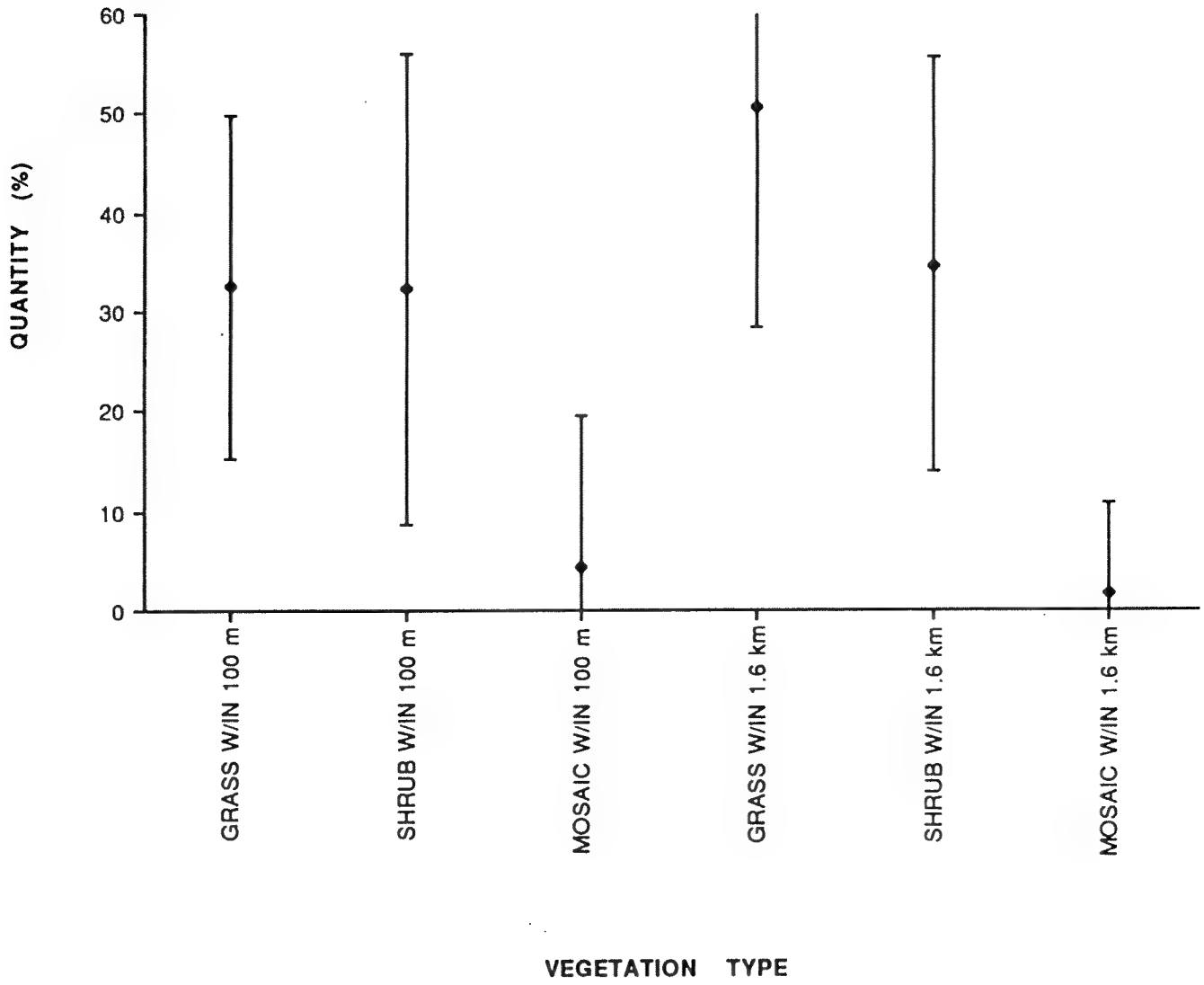

Figure 7. Vegetation surrounding Ferruginous Hawk nests in southwest Montana, 1992 (means with standard deviations, n = 43).

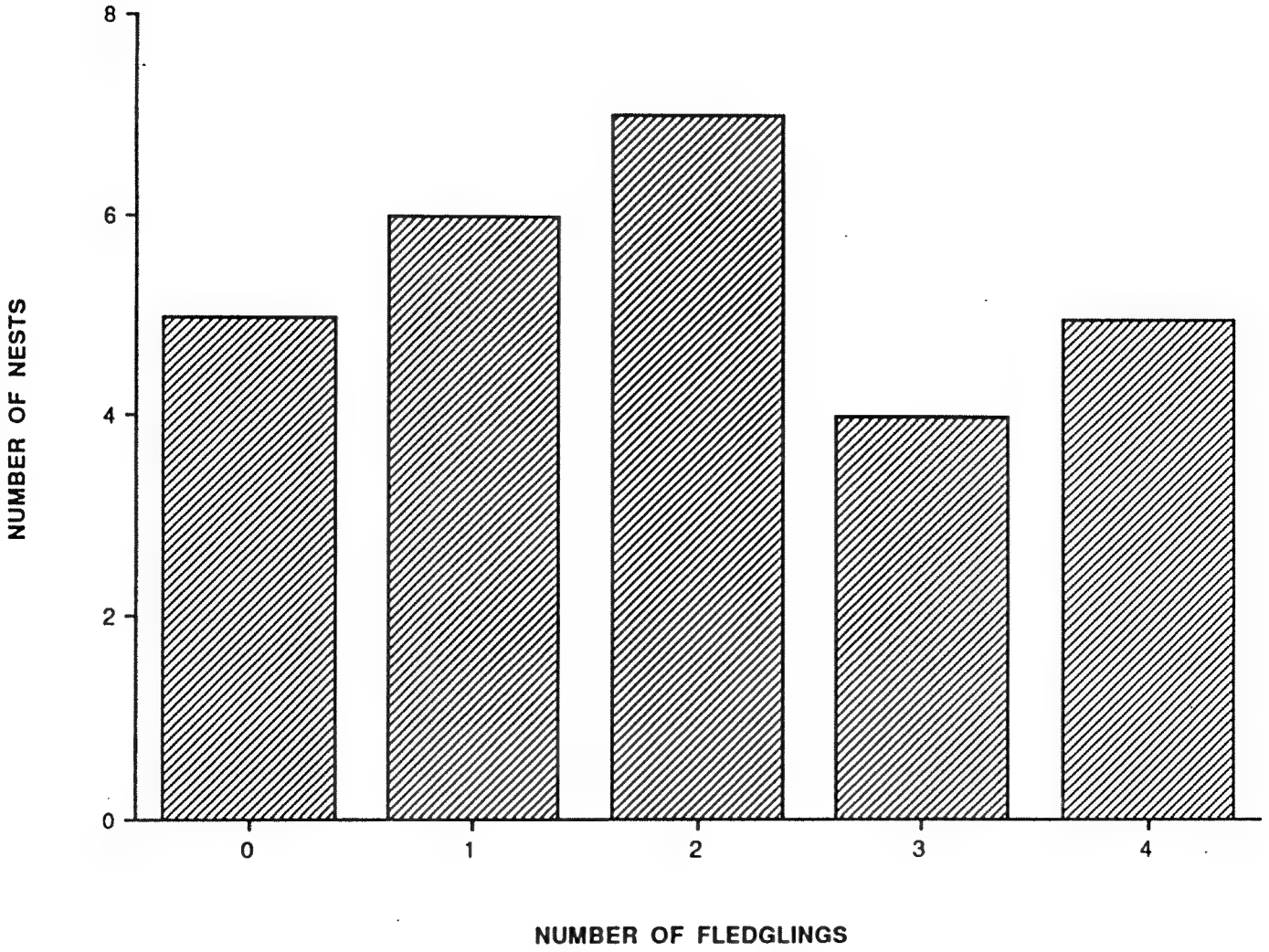

Figure 8. Productivity of Ferruginous Hawks in southwest Montana, 1992 ($\bar{x}$ = 1.93, SD = 1.38, n = 27).

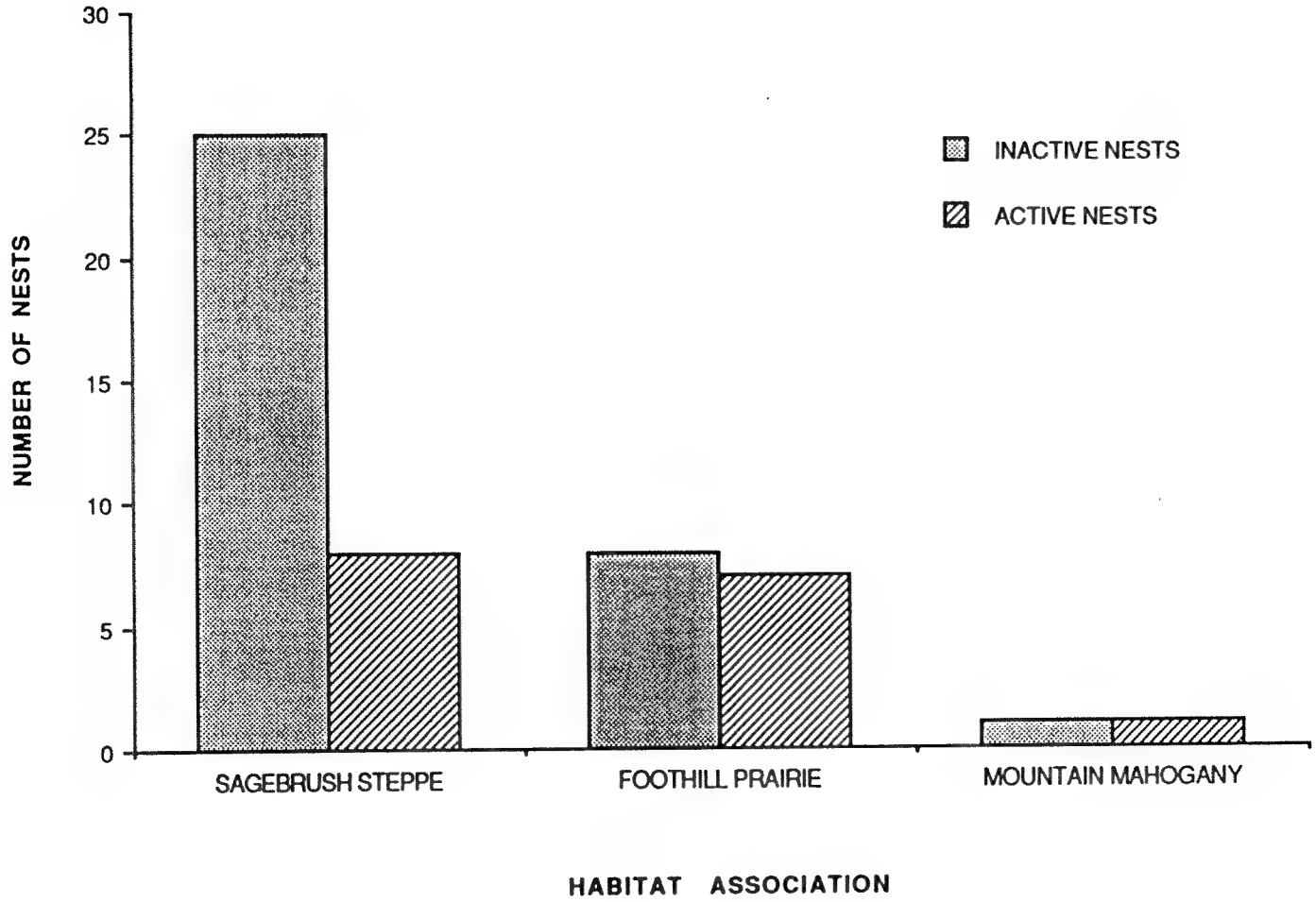

Figure 9. Habitat associations nested within by Ferruginous Hawks in southwest Montana, 1992 (n = 50).

squirrels (Spermophilus armatus and/or S. elegans) which accounted for nearly 46% of the total number of individual prey items identified (Table 2). In this population of Ferruginous Hawks, birds contributed substantially to nesting season diet accounting for nearly 20% of the identified prey items.

Vegetation diversity in a 375 m^2 plot centered at each of 15 nests from the Centennial Valley to the Frying Pan Basin west of Dillon are presented in Table 3.

DISCUSSION

This study concluded an inventory of the majority of public lands in southwest Montana for nesting Ferruginous Hawks. Even though the surveys were initiated too late to observe hawks early in the nesting season, coupled with the fact that breeding phenology was apparently advanced in 1992 (Jim Roscoe, pers. comm.), I documented a considerable number of successfully breeding Ferruginous Hawks during the study. The proportion of successfully reproducing hawks was high (81.5%) with only 5 nests failing during the breeding attempt. This value is slightly higher than the 57.9 and 70.6% for 1985 and 1986, respectively, reported by Myers (1987) and substantially higher than that reported for southeastern Montana (25-27.3%) (Ensign 1983). However, caution should be exercised when comparing these nesting success data to those of other studies since I may have

Table 2. Prey items identified in pellets and prey remains at Ferruginous Hawk nests.

Taxon	Number	%
Insects		
Red-legged Grasshopper		
Acrididae	12	13.79
Mammals		
Lagomorpha		
Cottontail Rabbit		
Sylvalagus sp.	4	4.60
White-tailed Jackrabbit		
Lepus townsendii	1	1.15
unident. lagomorph	1	1.15
total lagomorphs	(6)	(6.90)
Rodentia		
Northern Pocket Gopher		
Thomomys talpoides	6	6.90
Ground Squirrel		
Spermophilus sp.*	37	45.53
Vole		
Microtus sp.**	4	4.60
Sagebrush Vole		
Lagurus curtatus	1	1.15
Deermouse		
Peromyscus maniculatus	1	1.15
unident. rodent	3	3.45
total rodents	**(49)**	**(56.32)**
total mammals	**(55)**	**(63.22)**
Birds		
Sage Thrasher	7	8.05
Oreoscoptes montanus		
Horned Lark	4	4.60
Eremophila alpestris		
Black-billed Magpie	1	1.15
Pica pica		
Vesper Sparrow	1	1.15
Pooecetes gramineus		
unident. bird	4	4.60
total birds	(17)	(19.54)
Total	87	

Diversity indices:
H' = 2.01
N1 = 7.50
N2 = 4.71

* *S. armatus* or *S. elegans*
** *M. longicaudus* or *M. montanus*

Table 3. Vegetative diversity surrounding Ferruginous Hawk nests as measured through ECODATA methodology (DeVelice 1991).

NEST LOCATION (TRS)	# SPP.	H'	N1	N2	E5
06S09W32NWSWNE	11	1.59	4.89	3.81	0.72
06S09W20SENESW	16	2.39	10.93	10.38	0.94
06S09W17SWSENE	15	2.11	8.23	6.99	0.83
06S09W18SWSESE	11	1.92	6.81	6.01	0.86
06S09W08NESENE	19	2.05	7.79	5.78	0.71
14S04W29NWSWSW	26	2.58	13.26	8.51	0.61
14S04W28NESESE	36	2.56	12.87	8.53	0.63
14S05W35NENENE	18	2.23	9.29	7.50	0.78
14S05W35SWNENW	12	1.89	6.63	4.81	0.68
14S06W33SESENE	12	1.87	6.52	5.61	0.84
15S06W08NESENE	13	2.07	7.93	6.96	0.86
15S06W07SWSWNE	19	2.34	10.34	8.99	0.86
12S07W28SESESE	24	2.27	9.70	6.65	0.65
09S10W19NESWNE	14	1.81	6.13	3.40	0.47
07S11W35SENENW	11	1.96	7.08	6.01	0.82

H' = Shannon Index
N1 = Hill's Number One (number of abundant species)
N2 = Hill's Number Two (number of very abundant species)
E5 = Evenness (Modified Hill's Ratio)

missed nesting attempts that were aborted early in the season. The densities of active Ferruginous Hawk territories were lower than those determined by Myers (1987), however, the study-wide value was still greater than the nesting density found in southeastern Montana (Ensign 1983, Wittenhagen 1991). Myers (1987) observed that the highest nesting density was in the Mountain Mahogany (Cercocarpus ledifolius) Association, whereas the lowest density occurred in the Sagebrush Steppe Association (Kuchler 1964). I surveyed very little of the Mountain Mahogany Association, finding one occupied nest, and the highest densities that I recorded were in the Sagebrush Steppe Association (Diamond Butte Area) and the Foothill Prairie Association (Frying Pan Basin Area). The nesting densities in these latter two areas were comparable to, yet still lower than, the densities reported by Myers (1987) for those two associations. Interestingly, both of the above survey areas contained a considerable portion of private lands; more so than any of the other six areas inventoried.

The number of alternate nests contained within each of the sixteen active territories was very similar to the number/territory described by Myers (1987), with the majority of territories in each study containing no alternate nests.

Productivity per occupied territory was high and similar to the values reported for 1985 and 1986 by Myers (1987). The value of 1.97 fledglings per nest is adequate to maintain a stable population of Ferruginous Hawks based upon minimum requirement of 1.5 fledglings per nest assuming

mortality of 66% and 25% for juveniles and adults, respectively (Schmutz and Fyfe 1987, Woffinden and Murphy 1989).

Selection of nesting sites was variable and, hence, quite similar to that described by Myers (1987) for portions of southwest Montana surveyed during 1985 and 1986. While Myers (1987) found that Ferruginous Hawks most commonly nested on the ground, I observed only 3 ground nests, whereas, nests on rocky outcrops were by far the most common nest type accounting for 53% of the nests observed. If only the nests discovered in the actual surveys are included (deleting the nests in the Centennial Valley), only 2 nests were located on the ground and outcrop-nests comprised nearly 66% of the total. Additionally, I determined that average slope upon which Ferruginous Hawks nested was significantly greater than the slope described by Myers (1987) ($\underline{t} = 3.232$, $0.002 > p < 0.001$, $n = 366$). This difference was likely due to the more broken landscape surveyed during this study than during previous surveys in southwest Montana. Additionally, the slope gradient nested upon in southwest Montana was greater than nest slopes in southeast Montana (Ensign 1983). However, like Myers (1987) I determined that the majority of nests were located on the upper portion of slopes which may allow hawks an unobstructed vantage point and an efficient departure route from the nest.

A southern nest exposure such as I observed in this study, as well as in other studies (Smith and Murphy 1982, Ensign 1983, Myers 1987), has been interpreted to indicate a

preference for areas of high solar radiation and/or a preference for placing nests in line of the prevailing wind for lofting from the nest (Smith and Murphy 1982, Ensign 1983, Marco Restani, pers. comm.). Solar radiation may be of importance in this high elevation population of Ferruginous Hawks for when birds return from their wintering grounds snow cover may still be present in the study area and periods of inclement weather may occur in the spring (pers. observ.). This importance is borne out by the fact that three of the seven nests with a generally northward exposure (0-90° and 270-360°) were located in trees. Ferruginous Hawks, by nesting in trees, may be able to offset some of the harshness that they would experience when ground nesting on a north-facing slope.

I found the diet of Ferruginous Hawks in southwestern Montana to be quite diverse. Hill's measures of diversity, N1 and N2, correspond to the number of abundant and the number of very abundant species, respectively, in the diet sample (Ludwig and Reynolds 1988). Therefore, over seven (N1 = 7.5) different species were classified as abundant, including ground squirrels, red-legged grasshoppers, Sage Thrashers, northern pocket gophers, cottontail rabbits, voles, and Horned Larks. Over four species were classified as very abundant (N2 = 4.7). Much of the dietary diversity may be attributed to the fact that Ferruginous Hawks in our study area preyed heavily upon songbirds. Songbirds accounted for nearly 20% of the diet, somewhat higher than the 12.1% reported by Restani (1991) for the Centennial Valley. Other researchers have noted that avian prey

usually contribute little to Ferruginous Hawk diet and that a high proportion of avian prey in the diet may be inferred to be the result of hawks preying upon non-preferred and, hence, alternate prey during periods of low prey abundance (Schmutz et al. 1980, Ensign 1983, Gilmer and Stewart 1983). Without actual measures of prey abundance and diversity in southwest Montana, it is difficult to postulate whether avian species are alternate prey to this population of Ferruginous Hawks.

Vegetative diversity within 375 m^2 plots centered at nests, as measured by Hill's N1, was quite variable with five of the six nests exhibiting values > 9.0 located in or adjacent to the Centennial Valley. Additionally, seven of the nine nests with N1 < 9.0 were further north in the Beaverhead Valley. This trend may be due to different precipitation regimes from the Centennial Valley northward (and generally downward in elevation) and apparently was analogous to the prey abundance gradient that I observed.

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

Ferruginous Hawks are successfully reproducing on the public lands of southwestern Montana. Reproductive success during 1992 was high and hawks chose a variety of substrates upon which to nest. With the addition of the 15 previously unknown active territories discovered during this study to the 97 active territories described by Myers (1987), the five or six active territories on the Blacktail Wildlife Management Area (Dennis Flath, pers. comm.) and the 15 active sites in the Centennial Valley (Restani 1989), I

estimate that the breeding population of Ferruginous Hawks in Beaverhead and Madison counties comprise a minimum of 132 pairs. This estimate may be conservative for additional segments of public and private land have yet to be surveyed. These areas include the area between Sweetwater Creek and the Blacktail Wildlife Management Area which contains the Robb Ledford Wildlife Management Area where eight nests have been located [at least two active territories (E. C. Atkinson and Dennis Flath, unpub. data)].

Throughout the study area, active nests appeared to be clumped in their distribution with areas containing decadent nests situated between these active "complexes". Vegetative cover appeared to be similar between the areas of high activity and the unoccupied areas similar to the situation described by Fitzner et al. (1977) in southeastern Washington and Ann Black (pers. comm.) in Phillips County, Montana. I believe that the variables leading to these observations warrant further study. Ultimately, such factors as high site-fidelity, complexes containing related individuals, differential prey populations, grazing practices and the subsequent changes in vegetation associated with different intensities of grazing, in addition to human disturbance may all play a role in determining what areas in southwestern Montana are occupied by breeding Ferruginous Hawks.

The population of Ferruginous Hawks in southwest Montana is one of the most productive groups studied to date. Additionally, these breeding pairs show very high nesting density. Both of these factors lend make southwest

Montana an ideal area for further study, especially long-term projects.

I suggest the following for further work on the Ferruginous Hawk population of southwestern Montana.

A. Management of nest sites.

1. Minimize disturbance. Several researchers have highlighted the vulnerability of Ferruginous Hawks to human disturbance (Olendorff 1973, Ensign 1983), an observation reiterated by the fact that I believe 3 of the 5 recorded nest failures in this study were directly and indirectly human caused. Therefore, I propose direct contact or indirect information for ranchers, seismic crews, prospectors, and others using occupied Ferruginous Hawk habitat during the breeding season. Periods of high susceptibility include, but are not limited to, the period of egg-laying and incubation (mid April to early June) and the period of late nestling stage (early to late July) (Myers 1987, Lewis Myers, pers. comm.). Persons should be advised to maintain a distance of at least 450 m from active hawk nests to avoid flushing the bird (Ensign 1983) and should keep their activities in the territory to a minimum. In areas with active ground nests or easily accessed nests on outcrops, a delay in cattle grazing may allow hawks the opportunity to finish

incubation. Additionally, every effort should be made to place salt licks outside of active Ferruginous Hawk territories and water tanks.

2. Minimize power pole nesting. I observed one renesting attempt by a Ferruginous Hawk pair after their nest had been removed from a power pole. This pair attempted to reuse the same pole which ultimately resulted in loss of the nest during a storm. In areas where hawks attempt to nest on power poles (i.e. the Monida area) deterrents should be erected upon poles to discourage the use of this substrate by Ferruginous Hawks for nesting or suitable alternate structures should be erected nearby.

B. Research.

1. Assess the impacts of grazing. A long term monitoring project on a selected subset of Ferruginous Hawk nests and how the occupancy, nest success, and productivity relate to current and historical grazing practices would be very informative. It has been inferred that grazing can positively influence the foraging of Ferruginous Hawks by removing hiding cover for prey in addition to increasing the densities of some species of small mammals (Kochert et al. 1978, Wakely 1978, Schmutz 1987b). However, over the long term, grazing may also increase the

amount of woody vegetation in an area, a situation that is not conducive to Ferruginous Hawk foraging (Lewis Myers, pers. comm.). Locations on the Dillon Resource Area that may be appropriate for such a project are the Sage Creek area where Ferruginous Hawks are concentrated and the Matador Cattle Company grazes cattle on public land (Jim Roscoe, pers. comm.) and the Frying Pan Basin area.

2. Prey populations should be assessed. I observed what appeared to be a gradient of prey abundance, especially ground squirrels, from the Centennial Valley (high abundance) north to the apparently drier areas west of Dillon (low abundance). Does this apparent gradient correspond with a gradient of Ferruginous Hawk nesting density, nest success, and productivity?

ACKNOWLEDGEMENTS

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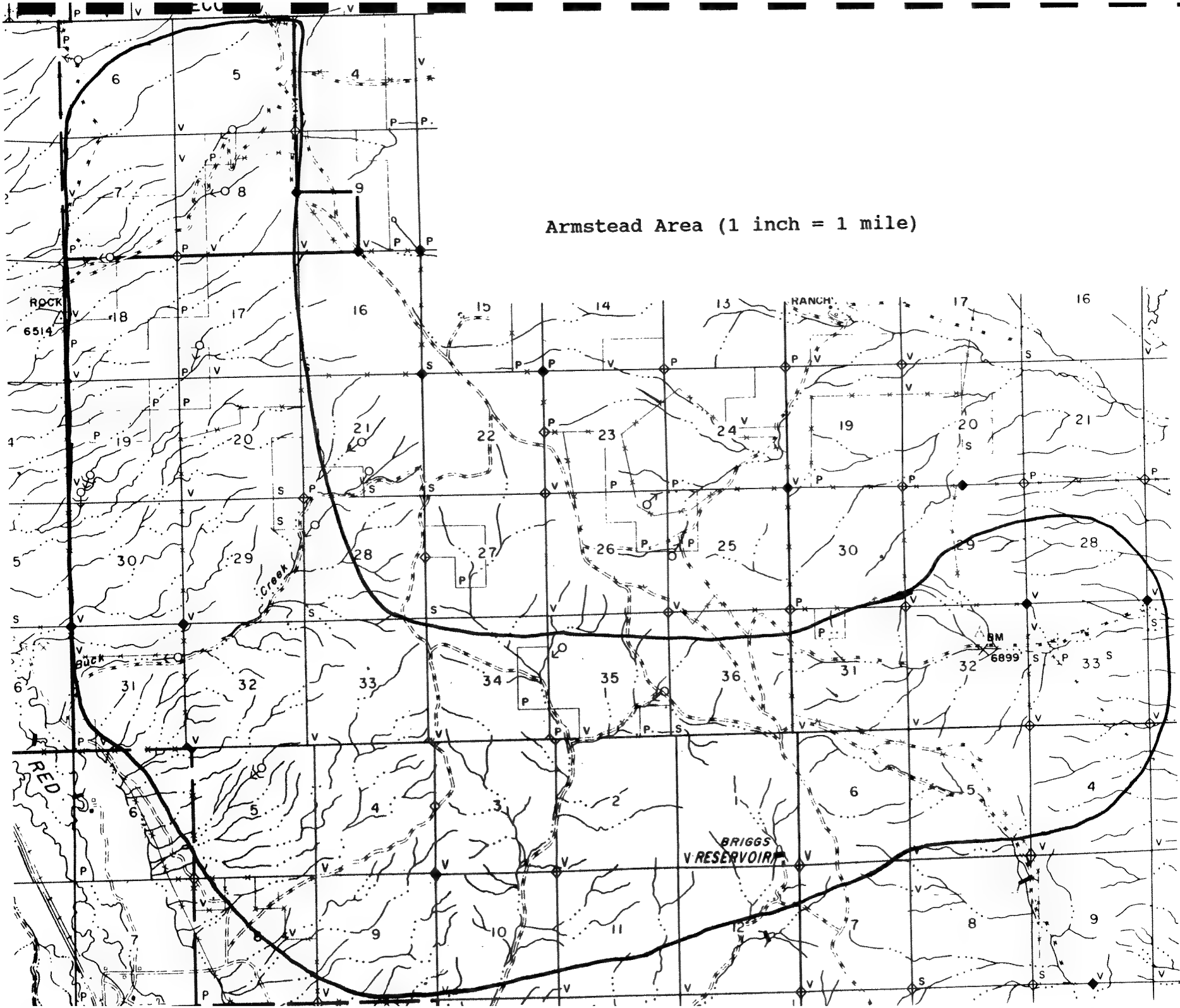
APPENDIX A

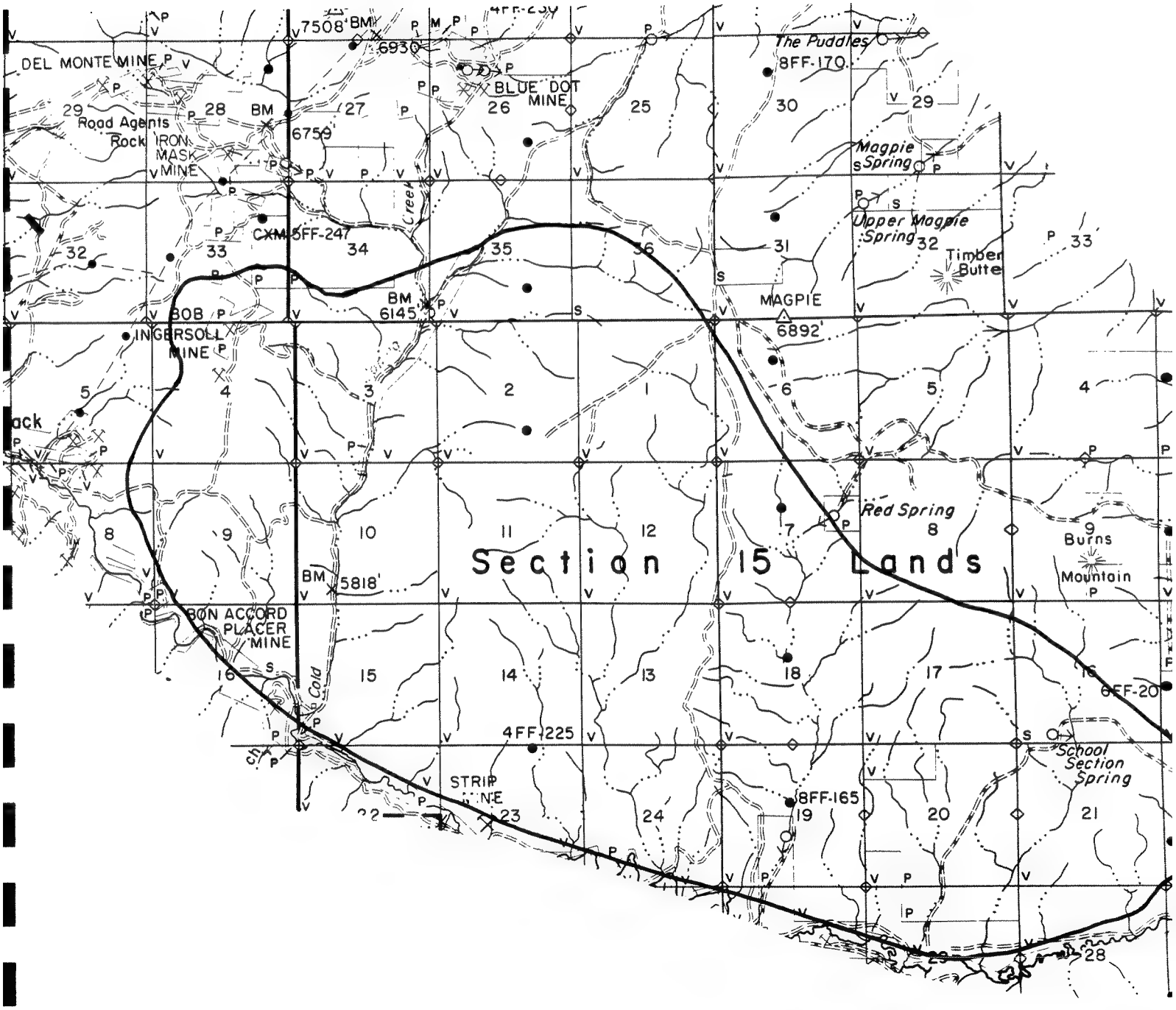
Areas surveyed for Ferruginous Hawks on the Dillon Resource Area in southwest Montana (1992).

Armstead Area (1 inch = 1 mile)



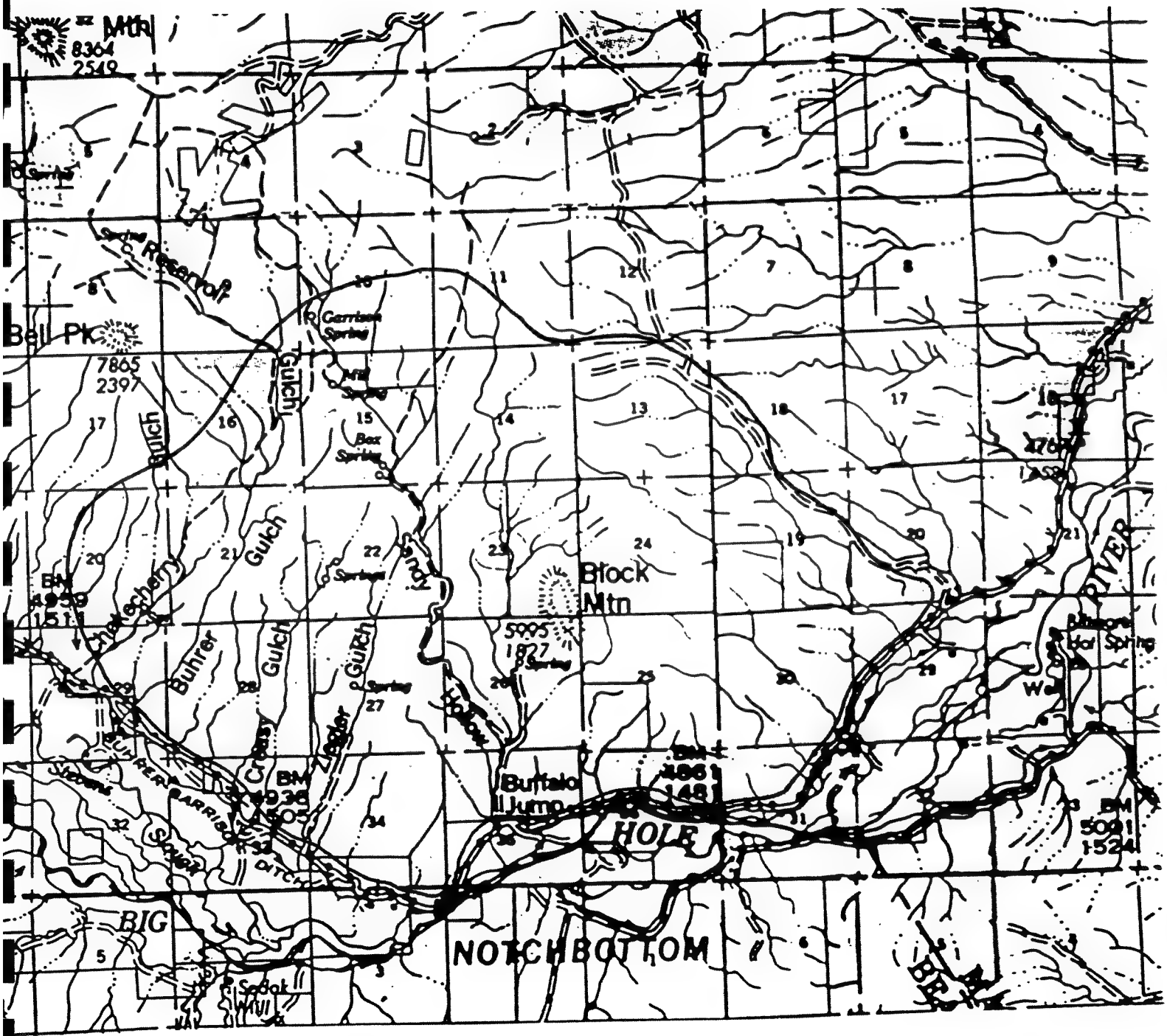
A-01

Bannack Area (1 inch = 1 mile) A-02

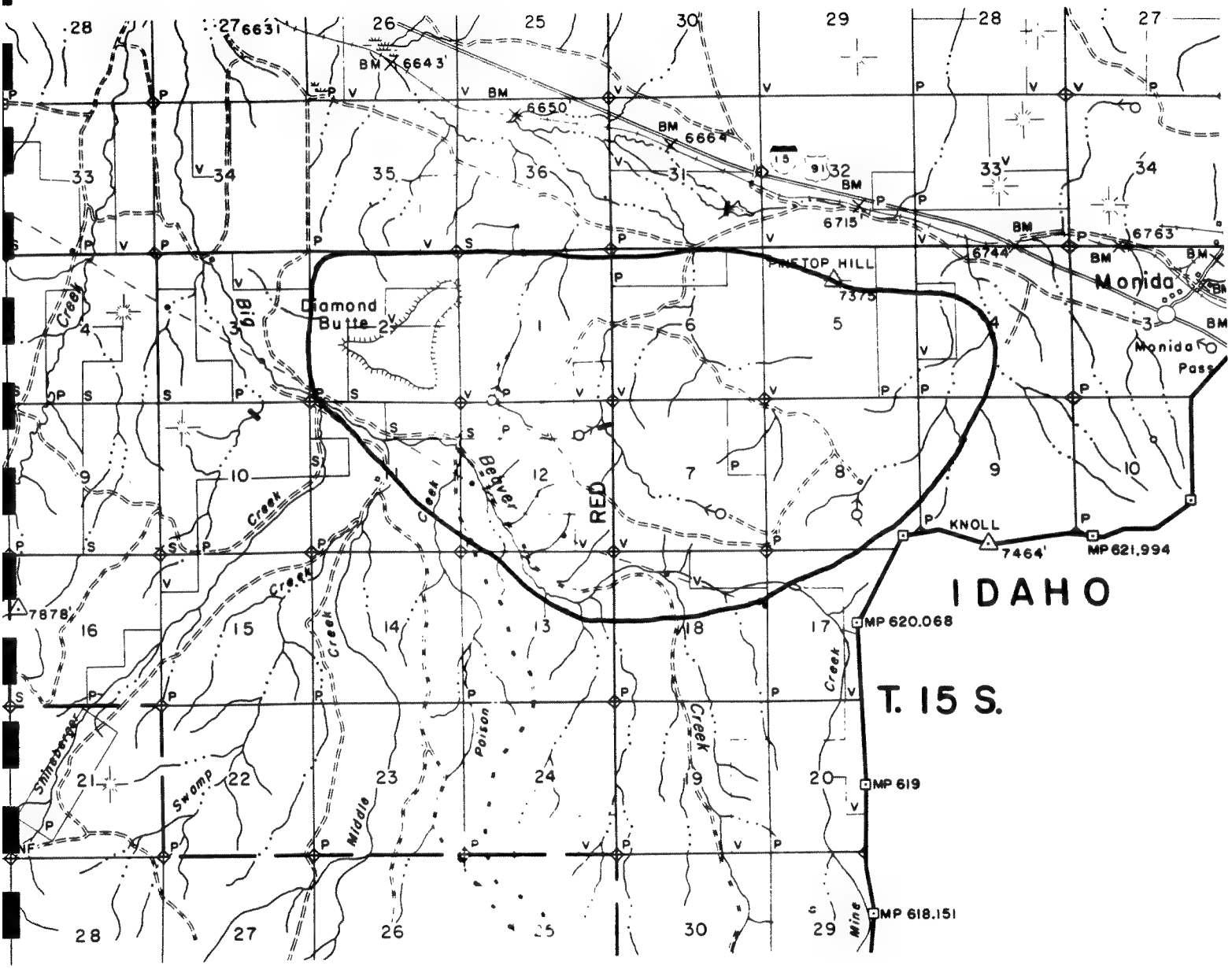


Block Mountain Area (1 inch = 1 mile)

A-03

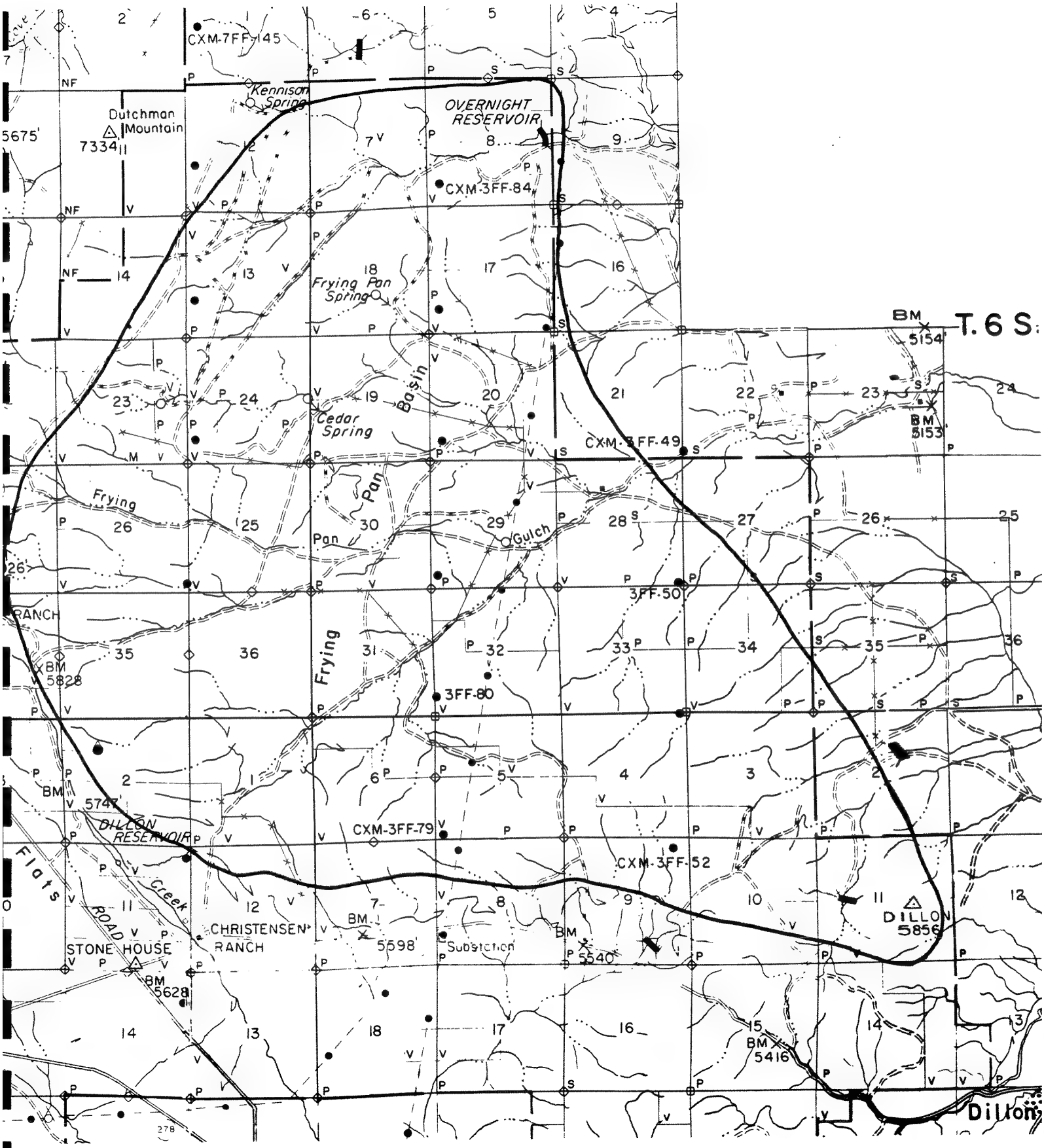


Diamond Butte Area (1 inch = 1 mile) A-04



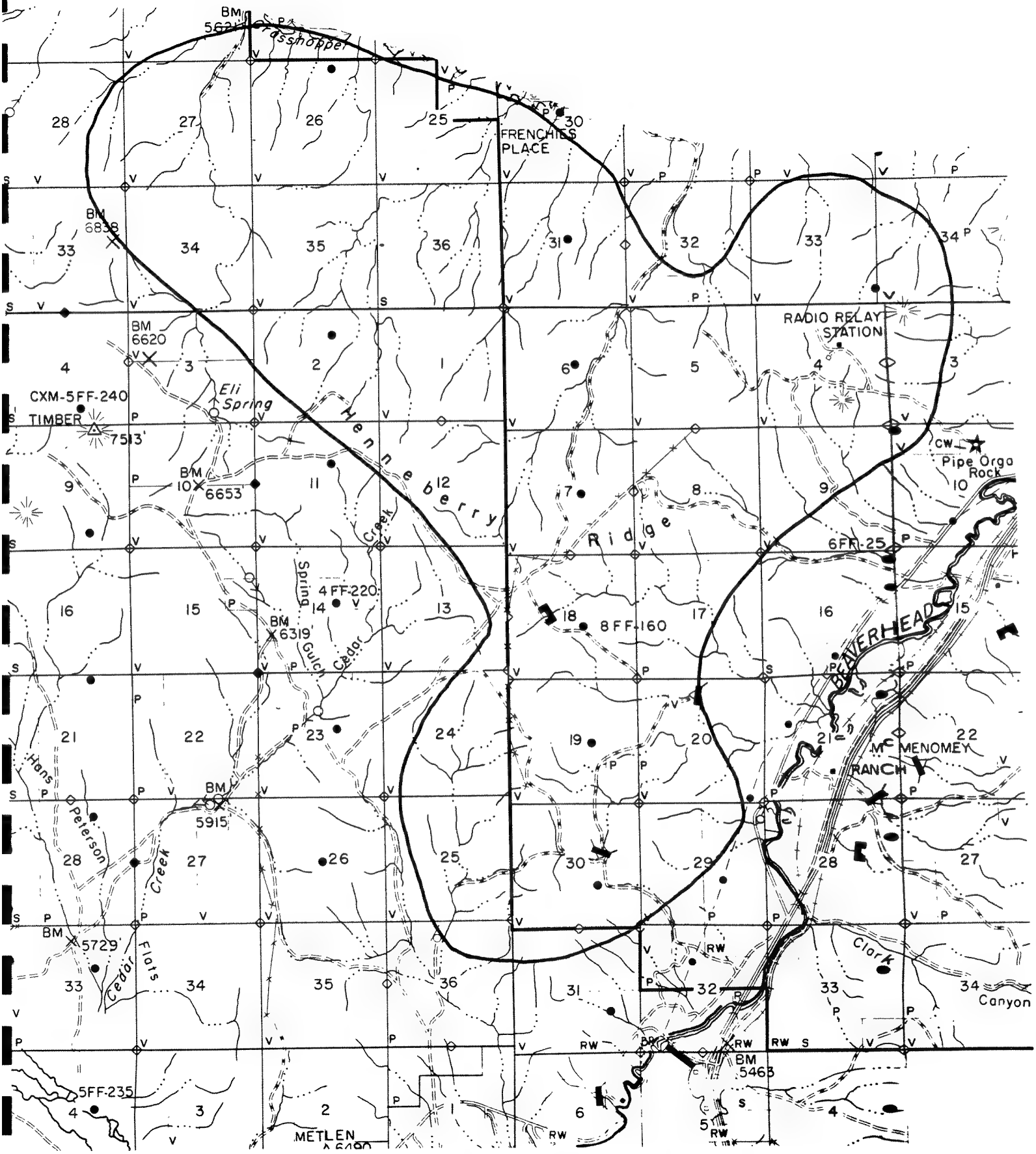
Frying Pan Basin (1 inch = 1 mile)

A-05

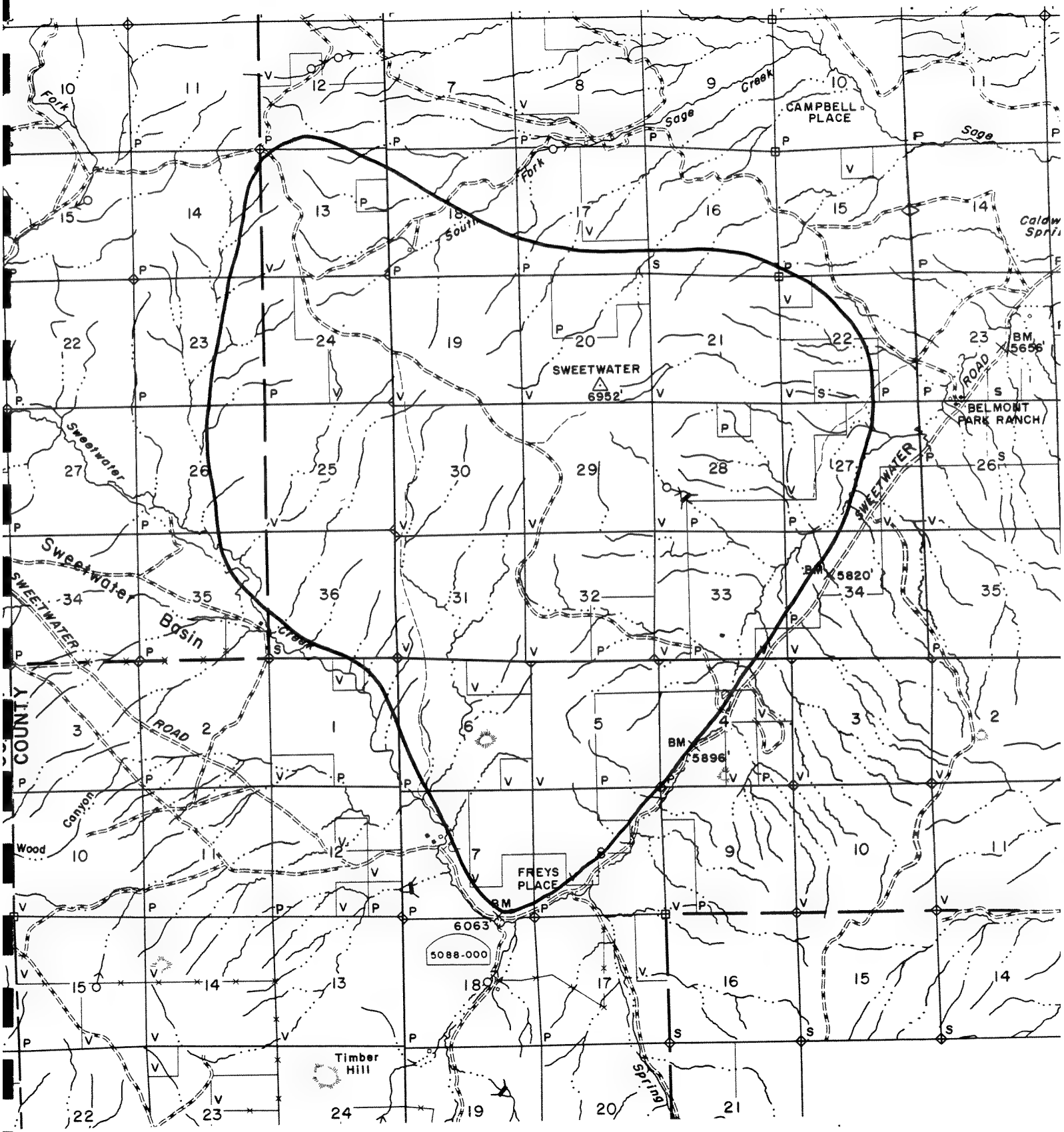


Henneberry Ridge Area (1 inch = 1 mile)

A-06

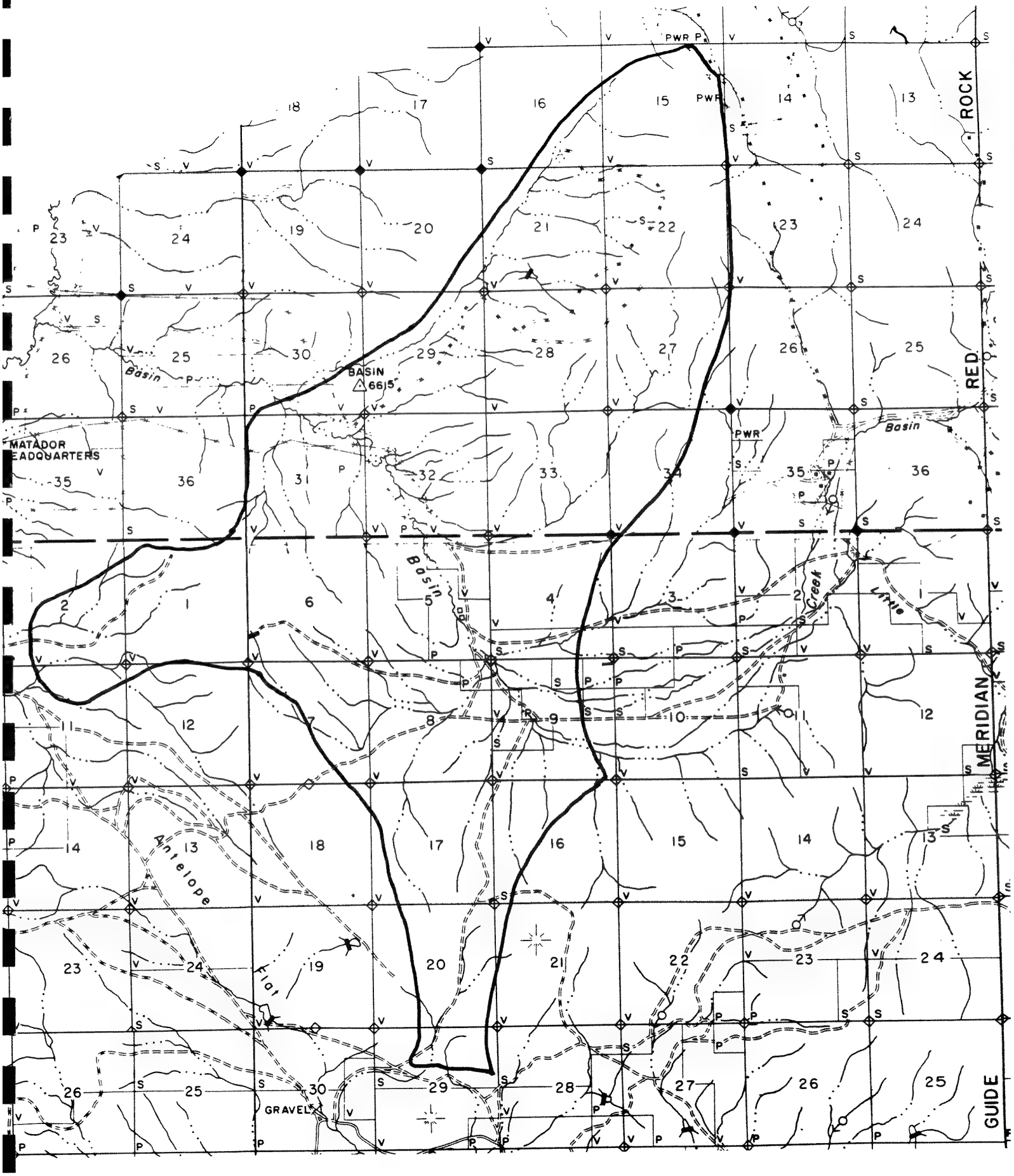


Sweetwater Area (1 inch = 1 mile) A-07



Vinegar Hill Area (1 inch = 1 mile)

A-08



APPENDIX B

Bureau of Land Management "Raptor Nest Inventory" Form.

RAPTOR NEST INVENTORY

(No.)

pecies: _____

ate: _____ Observer: _____

levation: _____ ft. Aspect _____ °

ite Slope (%) _____ Land Status _____

upport Structure 1/ _____

Species _____

Height (ft.) _____

Position (ft.) _____

DBH (in.) _____

Dead Crown (%) _____

Age (yrs.) _____

Slope Position (ft.) _____

est Structure

Platform

Height (in.) _____

Diameter (in.) _____

Material (%) _____

Cliff Structure

Ledge width (in.) _____

Overhang (in.) _____

Lateral extent _____

Opening dia. (in.) _____

cliff type 3 _____

Sheer extent 4 _____

est Origin (X)

Unknown ( )

Constructed ( )

Other species ( )

Perch Tree

Distance from nest (ft.) _____

Species _____

DBH (in.) _____

Height (ft.) _____

Age _____

Dead Crown (%) _____

Alternate Nest(s)

T ___ R ___ Sec. ___, ___ ¼ ___ ¼ ___ ¼ - ___ A _____ _____

T ___ R ___ Sec. ___, ___ ¼ ___ ¼ ___ ¼ - ___ B _____ _____

T ___ R ___ Sec. ___, ___ ¼ ___ ¼ ___ ¼ - ___ C _____ _____

T ___ R ___ Sec. ___, ___ ¼ ___ ¼ ___ ¼ - ___

Location of Alternates from primary nest: --- (Dist.) (Bearing)

Vegetative Structure Type	Radius 300' Height (in.)	Quantity (%)	Canopy (%)	Radius 1 Mile Quantity (%)
Grassland				
Grassland				
Shrub (5-15%)-grass				
Shrub (5-15%)-grass				
Shrubland (> 15%)				
Shrubland (> 15%)				
Shrub-conifer (1-20%)				
Wet Meadow/Riparian				
Riparian woody				
Deciduous woodland				
Conifer (> 20%)				
Conifer (> 20%)				
Scree-rock-talus				
Cropland	N/A			

Edge, distance from (ft.) _____ Eco tonal type 2/ _____

Permanent water, distance from (ft.) _____ Water type _____

Distance from roads (mi.) Primary _____ Secondary _____ Primitive _____

Nearest disturbance (mi.) _____ Describe: _____

Landform _____

Nearest nest (same species): _____ (other species): _____

NOTES:

B-01

1/ Tree, shrub, ground, outcrop, cliff, pole, dwelling

2/ Only if nest in ecotone

3/ [illegible] simple cliff complex cliff, other

Species _____ Nest No. _____

Date	Adults Occupy Territory (Y,N)	Nest Active (Y,N)	Incubating (Y,N)	Clutch Size	Hatched (Y,N)	No. Nestlings	Fledge Date	Fledge No.	Initials	Notes

APPENDIX C

Completed ECODATA forms and methodology for vegetation surrounding 15 Ferruginous Hawk nests in southwest Montana (1992).

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-01 MO 07 DAY 30 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemisia tridentata / Agropyron CT —
SITE Pallocate Ridge Spicatum STATE MT COUNTY BEAV
PURP G PREC S QUADNAME Bono QUADCODE 4511236
6S T/ 9W R/ 30 S/ NW 4S/ SW 4/4 COMMUNITY SIZE (acres) —
PLOT TYPES C PLTRL 35.8' PLOT W — SURVEY AYL
PHOTOS
DIRECTIONS -->

CONSERVATION RANKING

COND ___ Com:
VIAB ___ Com:
DEFN ___ Com:
RANK ___ Com:

MGMT:
PROT:

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM PLOT POS — SLP SHAPE — ASP
SLOPE % ELEVATION EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N E S W IFSLP — IFVAL —
SPFE —
GROUND COVER: 10 S+ 1 G+ 30 R+ 20 L+ 20 W+ 20 M+ 10 BV+ 10 O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)--> — lichen

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

C-02

PltIDL ___

PLOT NO. E-01 NO. SPECIES 11 PNC ARTTRI / AGRSPI

TREES Tot Cv ___ MHt ___
Tal Cv ___ Med Cv ___
Low Cv ___ Grd Cv ___

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 70 MHt 1.5'
Tal Cv – Med Cv 60
Low Cv 10 Grd Cv 3

			CC
S 1	Artemisia tridentata	ARTTRI	60
S 2	Artemisia longiloba	ARTFRI	3
S 3	Gutierrezia sarothrae	GUTSAR	1
S 4	Opuntia polyacantha	OPUPOL	3
S 5	'Ribes' spp	RIB	1
S 6	Chrysothamnus nauseosus	CHRNAU	1
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 50 MHt 1'
Med Cv 1 Low Cv 50
Grd Cv 10

			CC
G 1	Poa secunda ssp.	POASEC	20
G 2	Agropyron spicatum	AGRSPI	20
G 3	Sitanion hystrix	SITHYS	20
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv I MHt .25'
Med Cv – Low Cv I
Grd Cv I

			CC
F 1	Astragalus drummondii	ASTDRU	I
F 2	Eriogonum microthecum	ERIMIC	I
F 3			
F 4			
F 5			
F 6			
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv ___ MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___

BRYO/LICH Tot Cv 20 / 10
Sel

COMMENTS (EODATA) --> ___

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL ___ UNITS X ft __ m

PLOT NO. F-02 MO 07 DAY 30 YEAR 92 EOCODE ___ *___

EXAMINER(s) Pam Harrington Eric Atkinson

PNC Rhus trilobata / Agropyron spicatum CT ___

SITE Transmission Line Nest STATE MT COUNTY BEAV

PURP G PREC S QUADNAME BOND QUADCODE 45112 36

6S T/ 9W R/ 20S/ SE 4S/ NE 4/4 COMMUNITY SIZE (acres) ___

PLOT TYPES C PLTRL 35.8 PLOT W ___ SURVEY AYL

PHOTOS ___

DIRECTIONS --> ___

CONSERVATION RANKING

COND ___ Com: ___

VIAB ___ Com: ___

DEFN ___ Com: ___

RANK ___ Com: ___

MGMT: ___

PROT: ___

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT ___

SOIL UNIT ___ SOIL TAXON ___

PM ___ LANDFORM ___ PLOT POS ___ SLP SHAPE ___ ASP ___

SLOPE % ___ ELEVATION ___ EROS POTENT ___ EROS TYPE ___

HORIZON ANGLE (%): N___ E___ S___ W___ IFSLP ___ IFVAL ___

SPFE ___

GROUND COVER: 20 S+ 40 G+ 20 R+ 10 L+ ___ W+ ___ M+ 10 BV+ ___ O ~~-~~ = 100%

DISTURBANCE HISTORY (type, intensity, frequency, season) --> ___

RIPARIAN FEATURES: Channel Width ___ Channel Entrench ___

Surface Water ___ Ht.Abv.H2O ___ Dist. from H2O ___

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

C-04

PltIDL ___

PLOT NO. [illegible] NO. SPECIES 16 PNC RHUTRI / AGRSPI

TREES Tot Cv — MHt ___ Tal Cv ___ Med Cv ___ Low Cv ___ Grd Cv ___

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 50 MHt 1.5' Tal Cv — Med Cv 20 Low Cv 10 Grd Cv 20

			CC
S 1	Chrysothamnus nauseosus	CHRNAU	20
S 2	Artemesia frigida	ART FRI	20
S 3	Gutierrezia sarothrae	GUTSAR	10
S 4	Opuntia polyacantha	OPU POL	20
S 5	Eriogonum microthecum	ERIMIC	1
S 6	Artemesia tridentata	ART TRI	10
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 20 MHt 1' Med Cv — Low Cv 20 Grd Cv 20

			CC
G 1	Bouteloua gracilis	BOUGRA	20
G 2	Carex filifolia	CAREFI	T
G 3	Poa sandbergii	POASAN	10
G 4	Bromus tectorum	BROTEC	1
G 5	Agropyron spicatum	AGRSPI	20
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 20 MHt .2' Med Cv — Low Cv — Grd Cv 20

			CC
F 1	Astragalus drummondii	ASTDRU	1
F 2	Astragalus spp		10
F 3	Phlox hoodii	PHLHOO	20
F 4	Sphaeralcea coccinea	SPHCOC	1
F 5	Antennaria parviflora	ANTPAR	1
F 6			
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv — MHt ___ Med Cv ___ Low Cv ___ Grd Cv ___

BRYO / LICH Tot Cv — / T

COMMENTS (EODATA) --> ___

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m
PLOT NO. F-03 MO 07 DAY 30 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemesia tridentata / Agropyron spicatum CT —
SITE Irving Pan North STATE MT COUNTY REAV
PURP W PREC S QUADNAME Bond QUADCODE 4511236
6S T/ 9W R/ 17 S/ SW 4S/ SE 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AYL
PHOTOS
DIRECTIONS -->

CONSERVATION RANKING

COND ___ Com:
VIAB ___ Com:
DEFN ___ Com:
RANK ___ Com:

MGMT:
PROT:

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM ___ PLOT POS — SLP SHAPE — ASP ___
SLOPE % ___ ELEVATION ___ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N___ E___ S___ W___ IFSLP — IFVAL —
SPFE —
GROUND COVER: 30 S+ 10 G+ 30 R+ 20 L+ 1 W+ — M+ 10 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) -->

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

C-06

PltIDL ___

PLOT NO. E-23 NO. SPECIES 15 PNC ARTTRI / AGRSPI

TREES Tot Cv — MHt ___
Tal Cv ___ Med Cv ___
Low Cv ___ Grd Cv ___

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 40 MHt 1.5'
Tal Cv — Med Cv 20
Low Cv 20 Grd Cv 10

			CC
S 1	Artemesia frigida	ARTFRI	10
S 2	Artemesia tridentata	ARTTRI	20
S 3	Opuntia polyacantha	OPUPOL	10
S 4	Chrysothamnus nauseosus	CHRNAU	10
S 5	Ribes spp	RIB	1
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 30 MHt 1'
Med Cv 3 Low Cv 30
Grd Cv 1

			CC
G 1	Bouteloua gracilis	BOUGRA	10
G 2	Poa sandbergii	POASAN	1
G 3	Agropyron spicatum	AGRSPI	20
G 4	Oryzopsis hymenoides	ORYHYM	T
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 1 MHt .4'
Med Cv — Low Cv 1
Grd Cv T

			CC
F 1	Phlox hoodii	PHLHOO	1
F 2	Astragalus drummondii	ASTDRU	T
F 3	Chenopodium fremontii	CHEFRE	T
F 4	Grindelia squarrosa	GRISQU	T
F 5	Balsamorhiza sagittata	BALSAG	T
F 6	Lithospermum ruderale	LITRUD	T
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv ___ MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___

BRYO/LICH Tot Cv 10

COMMENTS (EODATA) --> ___

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-04 MO 07 DAY 30 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemesia tridentata / Agropyron spicatum CT —
SITE Bullshot STATE MT COUNTY BEAV
PURP W PREC S QUADNAME ARGENTA QUADCODE 4511237
6S T/ 9W R/ 18 S/ SW 4S/ SE 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AVL
PHOTOS
DIRECTIONS -->

CONSERVATION RANKING

COND ___ Com:
VIAB ___ Com:
DEFN ___ Com:
RANK ___ Com:

MGMT:
PROT:

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM ___ PLOT POS — SLP SHAPE — ASP ___
SLOPE % ___ ELEVATION ___ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N___ E___ S___ W___ IFSLP — IFVAL —
SPFE —
GROUND COVER: 10 S+ 20 G+ 30 R+ 10 L+ 10 W+ — M+ 10 BV+ 10 O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)--> ___

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

C-08

PltIDL ____

PLOT NO. E-04 NO. SPECIES 11 PNC ARTTRI / AGR SPI

TREES Tot Cv — MHt ___
Tal Cv ___ Med Cv ___
Low Cv ___ Grd Cv ___

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 40 MHt 1.5'
Tal Cv — Med Cv 10
Low Cv 20 Grd Cv 20

			CC
S 1	Artemisia tridentata	ARTTRI	20
S 2	Chrysothamnus nauseosus	CHRNAU	10
S 3	Opuntia polyacantha	OPUPOL	1
S 4	Artemisia frigida	ARTFRI	10
S 5	Cerebidens lobata	CERLAN	3
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 20 MHt 1'
Med Cv 3 Low Cv 30
Grd Cv —

			CC
G 1	Oryzopsis hymenoides	ORYHYM	20
G 2	Agropyron spicatum	AGRSPI	20
G 3			
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 3 MHt .2'
Med Cv — Low Cv 1
Grd Cv 3

			CC
F 1	Sphaeralcea coccinea	SPHCOC	1
F 2	Senecio canus	SENCAN	1
F 3	Lappula redowskii	LAPRED	1
F 4	Eriogonum microthecum	ERIMIC	3
F 5			
F 6			
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv ___ MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___
BRYO/LICH Tot Cv 10

COMMENTS (EODATA) --> _____

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL ___ UNITS ✓ ft __ m

PLOT NO. F-15 MO 07 DAY 30 YEAR 92 EOCODE ___ *___
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemesia tridentata / Agropyron spicatum CT ___
SITE Mixed Mtn Veg STATE MT COUNTY BEAV
PURP G PREC S QUADNAME BOND QUADCODE 45 112 36
6S T/ 9W R/ 8 S/ NE 4S/ SE 4/4 COMMUNITY SIZE (acres) ___
PLOT TYPES C PLTRL 35.8 PLOT W ___ SURVEY Ayl
PHOTOS ___
DIRECTIONS --> ___

CONSERVATION RANKING

COND ___ Com: ___
VIAB ___ Com: ___
DEFN ___ Com: ___
RANK ___ Com: ___

MGMT: ___
PROT: ___

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT ___
SOIL UNIT ___ SOIL TAXON ___
PM ___ LANDFORM ___ PLOT POS ___ SLP SHAPE ___ ASP ___
SLOPE % ___ ELEVATION ___ EROS POTENT ___ EROS TYPE ___
HORIZON ANGLE (%): N___ E___ S___ W___ IFSLP ___ IFVAL ___
SPFE ___
GROUND COVER: 10 S+ 20 G+ 30 R+ 10 L+ 10 W+ ___ M+ 10 BV+ 10 O (litter) = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) --> ___

RIPARIAN FEATURES: Channel Width ___ Channel Entrench ___
Surface Water ___ Ht.Abv.H2O ___ Dist. from H2O ___

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-10

PLOT NO. E-05 NO. SPECIES M PNC ARTTRI / AGRSPI

TREES Tot Cv — MHt —
Tal Cv — Med Cv —
Low Cv — Grd Cv —

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 40 MHt 1.5'
Tal Cv — Med Cv 20
Low Cv 20 Grd Cv 3

			CC
S 1	Artemisia tridentata	ARTTRI	30
S 2	Ribes spp	RIB	1
S 3	Gutierrezia sarothrae	GUTSAR	3
S 4	Artemesia frigida	ARTFRI	1
S 5	Opuntia polyacantha	OPUPOL	1
S 6	Chrysothamnus nauseosus	CHRNAU	1
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 30 MHt 1'
Med Cv — Low Cv 30
Grd Cv 10

			CC
G 1	Bouteloua gracilis	BOUGRA	10
G 2	Bromus tectorum	BROTEC	10
G 3	Agropyron spicatum	AGRSPI	20
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 30 MHt .4'
Med Cv — Low Cv 30
Grd Cv 1

			CC
F 1	Erigeron compositus	ERICOM	T
F 2	Potentilla pensylvanica	POTPEN	T
F 3	Chenopodium fremontii	CHEFRE	T
F 4	Senecio canus	SENCAN	1
F 5	Descurainia richardsonii	DESRIC	T
F 6	Lappula redowskii	LAPRED	T
F 7	Geum triflorum	GEUTRI	T
F 8	Anemone multifida	ANEMUL	T
F 9	Eriogonum pumilus	ERIPUM	1
F10	Stephanomeria tenuifolia	STETEN	30
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv — MHt — Med Cv —
Low Cv — Grd Cv —
BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> Plot in the ledge of a large rock outcrop — A 35.8 radius plot would not include the rock outcrop covered a sample including an area 5' out from the rock.

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-06 MO 07 DAY 31 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Agropyron spicatum / Poa sandbergii CT —
SITE Price Creek NE STATE MT COUNTY BEAV
PURP G PREC S QUADNAME CORRAL CREEK QUADCODE 4411252
14S T/ 4W R/ 29 S/ NW 4S/ SW 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AYL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND ___ Com: __
VIAB ___ Com: __
DEFN ___ Com: __
RANK ___ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: 50 S+ 30 G+ 3 R+ 1 L+ T W+ — M+ 10 BV+ T O ~ = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)--> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-12

PLOT NO. E-06 NO. SPECIES 26 PNC ACR SPI / POA SAN

TREES Tot Cv — MHt —
Tal Cv — Med Cv —
Low Cv — Grd Cv —

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 10 MHt 1'
Tal Cv — Med Cv T
Low Cv 10 Grd Cv T

			CC
S 1	Artemesia frigida	ARTFRI	3
S 2	Chrysothamnus viscidiflorus	CHRVIS	1
S 3	Amelanchier utahensis	AMEUTA	3
S 4	Rosa arkansana	ROSARK	1
S 5	Artemesia cana	ARTCAN	3
S 6	Sueda spp occidentalis	SUA	1
S 7	Ceratoides lanata	CERLAN	1
S 8	Artemesia tripartita	ARTTRI	3
S 9			
S10			
S11			
S12			

GRAM Tot Cv 30 MHt 1'
Med Cv 10 Low Cv 20
Grd Cv 1

			CC
G 1	Poa sandbergii	POASAN	T
G 2	Agropyron spicatum	AGRSPI	10
G 3	Oryzopsis hymenoides	ORYHYM	10
G 4	Stipa occidentalis	STIOCC	20
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 3 MHt .3'
Med Cv — Low Cv T
Grd Cv 3

			CC
F 1	Allium cernuum	ALLCER	T
F 2	Senecio canus	SENCAN	1
F 3	Penstemon aridus	PENARI	T
F 4	Linum perenne	LINPER	T
F 5	Physaria didymocarpa	PHYDID	T
F 6	Heterotheca horrida	HETHOR	T
F 7	Hymenopappus polycephalus	HYMPOL	1
F 8	Chaenactis douglasii	CHADOU	1
F 9	Erigeron pumilus	ERIPUM	1
F10	Taraxicum officinale	TAROFF	T
F11	Tragopogon dubius	TRADUB	T
F12	Phlox hoodii	PHLHOO	T
F13	Draba oligosperma	DRAOLI	T
F14	Antennaria parvifolia	ANTPAR	T
F15			

FERN Tot Cv — MHt — Med Cv —
Low Cv — Grd Cv —
BRYO/LICH Tot Cv T

COMMENTS (EODATA) --> Well dispersed

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-07 MO 07 DAY 31 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Herrington Eric Atkinson
PNC Artemesia tridentata / Agropyron spicatum CT —
SITE Lakeview Nest STATE MT COUNTY BEAV
PURP G PREC S QUADNAME BIG TABLE MTN QUADCODE 44112 S1
14S T/ 4W R/ 28 S/ NE 4S/ SE 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AYL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND ___ Com: __
VIAB ___ Com: __
DEFN ___ Com: __
RANK ___ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DI Conifer SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: 3 S+ 1 G+ — R+ 70 L+ — W+ — M+ 20 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)--> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL ___

PLOT NO. E-107 NO. SPECIES 36 PNC ART TRI / AGR SPI

TREES Tot Cv 40 MHt 28'
Tal Cv 40 Med Cv —
Low Cv — Grd Cv —

			CC
T 1	Pseudotsuga menziesii	PSEMEN	40
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 60 MHt 2'
Tal Cv — Med Cv 40
Low Cv 30 Grd Cv —

			CC
S 1	Artemesia tridentata	ARTTRI	40
S 2	Potentilla fruticosa	PENFLO	20
S 3	Rosa arkansana	ROSARK	10
S 4	Artemesia tripartita	ARTTRI	10
S 5	Prunus spp	PRU	30
S 6	Gutierrezia sarothrae	GUTSAR	3
S 7	Ribes spp	RIB	1
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 90 MHt 1'
Med Cv 20 Low Cv 70
Grd Cv 10

			CC
G 1	Poa pratensis	POAPRA	70
G 2	Bromus tectorum	BROTEC	3
G 3	Koeleria cristata	KOECRI	10
G 4	Hordeum brachyantherum	HORBRA	10
G 5	Carex filifolia	CARFIL	T
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 20 MHt 4'
Med Cv — Low Cv 3
Grd Cv 20

			CC
F 1	Achillea millefolium	ACHMIL	1
F 2	Geum triflorum	GEITRI	1
F 3	Allium cernuum	ALLCER	1
F 4	Erigeron pumilus	ERIPUM	T
F 5	Antennaria microphylla	ANTPAR	1
F 6	Taraxacum officinale	TAROFF	10
F 7	Erigeron compositus	ERICOM	T
F 8	Hetheotheca horrida	HETHOR	T
F 9	Gaillardia aristata	GAIARI	T
F10	Pseralea tenuiflora	PSOTEN	T
F11	Cheenactis douglasii	CHADOU	1
F12	Gentiana affinis	GENAFF	T
F13	Eriogonum umbellatum	ERIUMB	T
F14	Phlox hoodii	PHLHOO	T
F15	Sedum lanceolatum	SEDLAN	1
	Castilleja spp	CAS	T
	Fragaria virginiana	FRAVIR	10
	Lupinus sericeus	LUPSER	1
	Cirsium spp	CIR	T
	Tragopogon dubius	TRADUB	T
	Linum perenne	LINPER	T
	Cynoglossum officinale	CYNOFF	1
	Iris missouriensis	IRIMIS	T

FERN Tot Cv ___ MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___

BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> _____

COMMUNITY SURVEY FORM

MTNHP
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GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-08 MO 07 DAY 31 YEAR 92 EOCODE — *__
EXAMINER(S) Pam Harrington Eric Atkinson
PNC Rhus trilobata / Agropyron spicatum CT —
SITE Bush Cain NW STATE MT COUNTY BEAV
PURP IG PREC S QUADNAME MONIDA QUADCODE 44112S3
14S T/ 5W R/ 35 S/ NE 4S/ NE 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AVL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND __ Com: __
VIAB __ Com: __
DEFN __ Com: __
RANK __ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DL Deciduous SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: 30 S+ — G+ — R+ 20 L+ 10 W+ 20 M+ 20 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)--> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-16

PLOT NO. F-05 NO. SPECIES 18 PNC KHUTRI / AGRSPI

TREES Tot Cv 50 MHt 15' Tal Cv 50 Med Cv — Low Cv — Grd Cv —

			CC
T 1	Willow spp	SAL	50
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 10 MHt 2' Tal Cv 10 Med Cv 3 Low Cv — Grd Cv —

			CC
S 1	Ribes spp	RIB	3
S 2	Pentaphylloides floribunda	PEN FLO	3
S 3	Rosa arkansana	ROS ARK	3
S 4			
S 5			
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 95 MHt 2' Med Cv 50 Low Cv 50 Grd Cv —

			CC
G 1	Poa pratense	POA PRA	40
G 2	Alopecurus alpinus	ALO ALP	30
G 3	Hordeum brachyantherum	HOR BRA	20
G 4	Reckmannia syzigachne	RECSYZ	50
G 5	Carex pachystachya	CAR PAC	20
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 20 MHt 1' Med Cv 10 Low Cv 10 Grd Cv 3

			CC
F 1	MENTHA spp	MEN	T
F 2	Cynoglossum officinale	CYN OFF	10
F 3	Achillea millifolium	ACH MIL	T
F 4	Geum macrophyllum	GEU MAC	1
F 5	Senecio integerrimus	SEN INT	10
F 6	Machaeranthera canescens	MAC CAN	T
F 7	Potentilla anserina	POT ANS	?
F 8	Taraxicum officinale	TAR OFF	3
F 9	Erigeron pumulus	ERI PUM	T
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv — MHt ___ Med Cv ___ Low Cv ___ Grd Cv ___

BRYO/LICH Tot Cv T

COMMENTS (EODATA) --> _____

COMMUNITY SURVEY FORM

MTNHP
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GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-09 MO 07 DAY 21 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Rhus trilobata / Agropyron spicatum CT —
SITE Monida Pass STATE MT COUNTY BEAV
PURP G PREC S QUADNAME MONIDA QUADCODE 44112 53
14S T/ 4W R/ 35 S/ SW4S/ NE 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AYL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND ___ Com: __
VIAB ___ Com: __
DEFN ___ Com: __
RANK ___ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DL Deciduous SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: — S+ — G+ — R+ 80 L+ 1 W+ — M+ 20 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) --> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-18

PLOT NO. F-09 NO. SPECIES 10 PNC RHUTRI / AGRSPI

TREES Tot Cv 30 MHt 18'
Tal Cv 30 Med Cv —
Low Cv — Grd Cv —

			CC
T 1	Willow spp	SAL	30
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 50 MHt 10'
Tal Cv — Med Cv 50
Low Cv — Grd Cv —

			CC
S 1	Willow spp	SAL	50
S 2	Ribes spp	RIB	3
S 3	Artemesia ludoviciana	ARTLUD	1
S 4			
S 5			
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 30 MHt 1'
Med Cv 10 Low Cv 20
Grd Cv —

			CC
G 1	Carex pachystachya	CARPAC	10
G 2	Poa pratense	POAPRA	10
G 3	Alopecurus alpinus	ALOALP	10
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 20 MHt 1.5'
Med Cv 10 Low Cv 10
Grd Cv —

			CC
F 1	Gelum macrophyllum	GEUMAC	10
F 2	Galium boreale	GALBOR	T
F 3	Senecio integerrimus	SENINT	3
F 4	Cirsium spp	CIR	3
F 5	Lewisia pygmaea	LEWPYG	2
F 6			
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv — MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___

BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> _____

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. E-10 MO 07 DAY 31 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemesia tridentata / Agropyron spicatum CT —
SITE Horse Pole Ridge STATE MT COUNTY BEAV
PURP G PREC S QUADNAME MONIDA QUADCODE 4411253
14S T/ 6W R/ 33S/ SE4S/ SE 4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AXL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND ___ Com: __
VIAB ___ Com: __
DEFN ___ Com: __
RANK ___ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: 30 S+ T G+ — R+ 50 L+ — W+ — M+ 20 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) --> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-20

PLOT NO. F-10 NO. SPECIES 12 PNC ART TRI / AGR SPI

TREES Tot Cv — MHt ___
Tal Cv ___ Med Cv ___
Low Cv ___ Grd Cv ___

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 60 MHt 1'
Tal Cv — Med Cv 20
Low Cv 50 Grd Cv —

			CC
S 1	Artemesia tridentata	ARTTRI	40
S 2	Gutierrezia sarothrae	GUTSAR	30
S 3	Artemesia tripartita	ARTTRI	10
S 4			
S 5			
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 60 MHt .5'
Med Cv — Low Cv 20
Grd Cv 50

			CC
G 1	Poa sandbergii	POASAN	40
G 2	Agropyron smithii	AGRSMI	40
G 3	Koeleria macrantha	KOEMAC	10
G 4	Carex filifolia	CARFIL	3
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 3 MHt .2'
Med Cv — Low Cv 1
Grd Cv 3

			CC
F 1	Draba oligosperma	DRAOLI	3
F 2	Linum perenne	LINPER	T
F 3	Erigeron pumilus	ERIPUM	1
F 4	Commandra umbellata	COMUMB	1
F 5	Phlox hoodii	PHLHOO	1
F 6			
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv — MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___
BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> ___

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-11 MO 07 DAY 31 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemisia tridentata / Agropyron spicatum CT —
SITE Diamond Butte West STATE MT COUNTY BEAV
PURP G PREC S QUADNAME MONIDA QUADCODE 4411253
15ST/ 6W R/ 8 S/ NE 4S/ SE 4/4 COMMUNITY SIZE (acres) ____
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AVL
PHOTOS ____
DIRECTIONS --> ____

CONSERVATION RANKING

COND ___ Com: ____
VIAB ___ Com: ____
DEFN ___ Com: ____
RANK ___ Com: ____

MGMT: ____
PROT: ____

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM ____ PLOT POS — SLP SHAPE — ASP ____
SLOPE % ____ ELEVATION ____ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: 10 S+ 50 G+ 20 R+ 10 L+ — W+ — M+ 10 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) --> ____

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-22

PLOT NO. F-11 NO. SPECIES 13 PNC ARTTRI / AGRSPI

TREES Tot Cv — MHt —
Tal Cv — Med Cv —
Low Cv — Grd Cv —

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 30 MHt 1'
Tal Cv — Med Cv 3
Low Cv 30 Grd Cv 3

			CC
S 1	Artemesia tridentata	ARTTRI	20
S 2	Gutierrezia sarothrae	GUTSAR	20
S 3	Rosa arkansana	ROSARK	1
S 4			
S 5			
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 20 MHt 1.5'
Med Cv 10 Low Cv 20
Grd Cv —

			CC
G 1	Bromus tectorum	BROTEC	10
G 2	Pascopyrum spicatum	AGRSPI	10
G 3	Elymus cinereus	ELYCIN	10
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 20 MHt .5'
Med Cv 1 Low Cv 3
Grd Cv 20

			CC
F 1	Astragalus spp	AST	1
F 2	Arabis holboellii	ARAHOL	T
F 3	Eriogonum umbellatum	ERIUMB	10
F 4	Machaeranthera canescens	MACCAN	1
F 5	Phacelia hastata	PHAHAS	3
F 6	Chaenactis douglasii	CHADOU	1
F 7	Lupinus sericeus	LUPSER	1
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

F-6

FERN Tot Cv — MHt — Med Cv —
Low Cv — Grd Cv —
BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> _____

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m
PLOT NO. F-12 MO 07 DAY 31 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Artemesia Tridentata / Agropyron spicatum CT —
SITE Foothill Rd STATE MT COUNTY BEAV
PURP G PREC S QUADNAME SNOWLINE QUADCODE 4911254
15S T/ 6WR/ 7 S/ SW4S/ SW4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 25.8 PLOT W — SURVEY AVL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND __ Com: __
VIAB __ Com: __
DEFN __ Com: __
RANK __ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DL Conifer SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: 1 S+ — G+ — R+ 80 L+ 3 W+ — M+ 20 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)--> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H20 — Dist. from H20 —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL ___ C-24

PLOT NO. F-12 NO. SPECIES 19 PNC ARTTRI / AGRSPI

TREES Tot Cv 30 MHt 22'
Tal Cv 30 Med Cv 1
Low Cv 1 Grd Cv —

			CC
T 1	Pseudotsuga menziesii	PSEMEN	30
T 2	U		
T 3			
T 4			
T 5			

SHRBS Tot Cv 80 MHt 2'
Tal Cv — Med Cv 70
Low Cv 20 Grd Cv —

			CC
S 1	Artemisia tridentata	ARTTRI	20
S 2	Symphoricarpos sp.	SYM	30
S 3	Ribes spp.	RIB	30
S 4	Eutrema edwardsii	EUTEDW	20
S 5			
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 40 MHt 1.5'
Med Cv 30 Low Cv 20
Grd Cv —

			CC
G 1	Stipa comata	STICOM	10
G 2	Agropyron spicatum	AGRSPI	10
G 3	Bromus japonicus	BROJAP	T
G 4	Festuca idahoensis	FESIDA	10
G 5	Stipa occidentalis	STIOCC	30
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 10 MHt .5'
Med Cv — Low Cv 10
Grd Cv 3

			CC	
F 1	Achillea millefolium	ACHMIL	1	
F 2	Eriogonum umbellatum	ERIUMB	1	F-11
F 3	Berberis repens	BERREP	1	
F 4	Draba oligosperma	DRAOLI	1	
F 5	Balsamorhiza sagittata	BALSAG	3	
F 6	Lupinus sericeus	LUPSER	T	F-11
F 7	Galium boreale	GALBOR	1	F-09 ✓
F 8	Delphinium bicolor	DELBIC	1	
F 9	Erysimum inconspicuum	ERYINC	T	
F10				
F11				
F12				
F13				
F14				
F15				

FERN Tot Cv — MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___

BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> ___

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft m

PLOT NO. F-13 MO 08 DAY 01 YEAR 92 EOCODE — *
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Cercocarpus ledifolius/Agropyron spicatum CT —
SITE Vinegar Hill STATE MT COUNTY BEAV
PURP G PREC S QUADNAME VINEGAR HILL QUADCODE 4411274
12S T/ 7W R/ 28 S/ SE 4S/ SE 4/4 COMMUNITY SIZE (acres)
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AYL
PHOTOS
DIRECTIONS -->

CONSERVATION RANKING

COND ___ Com:
VIAB ___ Com:
DEFN ___ Com:
RANK ___ Com:

MGMT:
PROT:

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM PLOT POS — SLP SHAPE — ASP
SLOPE % ELEVATION EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N E S W IFSLP — IFVAL —
SPFE —
GROUND COVER: 30 S+ 10 G+ 10 R+ 30 L+ 10 W+ — M+ 10 BV+ — O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season)-->

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H2O — Dist. from H2O —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL C-26

PLOT NO. F-13 NO. SPECIES 24 PNC CERIED / AGR SPI

TREES Tot Cv — MHt —
Tal Cv — Med Cv —
Low Cv — Grd Cv —

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 50 MHt 3'
Tal Cv — Med Cv 40
Low Cv 20 Grd Cv 3

			CC
S 1	Cercocarpus ledifolius	CERLED	40
S 2	Gutierrezia sarothrae	GUTSAR	1
S 3	Artemesia tridentata	ARTTRI	10
S 4	Artemesia frigida	ARTFRI	3
S 5	Chrysothamnus Nauseosus	CHRNAU	3
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 50 MHt 1'
Med Cv 30 Low Cv 20
Grd Cv 3

			CC
G 1	Oryzopsis hymenoides	ORYHYM	20
G 2	Haroopyron Sericatum	AGRSER	30
G 3	Stipa comata	STICOM	1
G 4	Muhlenbergia cuspidata	MUHCUS	10
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 20 MHt .5'
Med Cv — Low Cv 10
Grd Cv 10

			CC
F 1	Linum perenne	LINPER	3
F 2	Astragalus (two species)	spp.	1
F 3	Potentilla gracilis	POTGRA	T
F 4	Tragopogon dubius	TRADUB	T
F 5	Hymenoxys polycephala	HYMPOL	T
F 6	Antennaria parvifolia	ANTPAR	1
F 7	Machaeranthera canescens	MACCAN	T
F 8	Stanleya viridiflora	STAVIR	T
F 9	Draba oligosperma	DRAOLI	T
F10	Lewisia pygmaea	LEWPYG	T
F11	Eriogonum Thetyi	ERITHE	T
F12	Sedum lanceolatum	SEDLAN	T
F13	Chaenactis douglasii	CHADOU	T
F14	Astragalus drummondii	ASTDRU	T
F15	Taraxacum officinale	TAROFF	10

FERN Tot Cv — MHt — Med Cv —
Low Cv — Grd Cv —
BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> _____

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft m

PLOT NO. F-14 MO 08 DAY 01 YEAR 92 EOCODE — *
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Stipa comata / Bouteloua gracilis CT —
SITE 4 eaa Hunkpa STATE MT COUNTY BEAV
PURP G PREC S QUADNAME DALYS QUADCODE 4511217
9S T/ 10WR/ 19 S/ NE4S/ SW4/4 COMMUNITY SIZE (acres)
PLOT TYPES C PLTRL 35.8 PLOT W — SURVEY AYL
PHOTOS
DIRECTIONS -->

CONSERVATION RANKING

COND ___ Com:
VIAB ___ Com:
DEFN ___ Com:
RANK ___ Com:

MGMT:
PROT:

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM PLOT POS — SLP SHAPE — ASP
SLOPE % ELEVATION EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N E S W IFSLP — IFVAL —
SPFE —
GROUND COVER: 3 S+ 40 G+ 40 R+ 10 L+ — W+ — M+ 3 BV+ 3 O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) -->

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H2O — Dist. from H2O —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL —

PLOT NO. F-14 NO. SPECIES 14 PNC STICom / BOUGRA

TREES Tot Cv — MHt ___
Tal Cv ___ Med Cv ___
Low Cv ___ Grd Cv ___

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 10 MHt 1'
Tal Cv — Med Cv 1
Low Cv 3 Grd Cv 10

			CC
S 1	Artemesia frigida	ARTFRI	3
S 2	Gutierrezia Sarothrae	GUTSAR	1
S 3	Chrysothamnus nauseosus	CHRNAU	3
S 4	Juniperus communis	JUNCOM	1
S 5	Artemesia tripartita	ARTTRI	1
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 20 MHt .8'
Med Cv T Low Cv 20
Grd Cv 3

			CC
G 1	Stipa comata	STICOM	20
G 2	Muhlenbergia cuspidata	MUHCUS	T
G 3	Agropyron spicatum	AGRSPI	1
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 3 MHt .2'
Med Cv — Low Cv —
Grd Cv 3

			CC
F 1	Senecio canus	SENCAN	1
F 2	Lactuca spp	LAC	1
F 3	Phlox hoodii	PHLHOO	1
F 4	Sedum lanceolatum	SEDLAN	1
F 5	Eriogonum chrysops	ERICHR	T
F 6	Erigeron compositus	ERICOM	T
F 7			
F 8			
F 9			
F10			
F11			
F12			
F13			
F14			
F15			

FERN Tot Cv — MHt ___ Med Cv ___
Low Cv ___ Grd Cv ___
BRYO/LICH Tot Cv —

COMMENTS (EODATA) --> ___

COMMUNITY SURVEY FORM

MTNHP
5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

MANUAL — UNITS X ft __ m

PLOT NO. F-15 MO 08 DAY 01 YEAR 92 EOCODE — *__
EXAMINER(s) Pam Harrington Eric Atkinson
PNC Agropyron spicatum / Poa sandbergii CT —
SITE Pannack NAT STATE MT COUNTY BEAV
PURP G PREC S QUADNAME BANNACK QUADCODE 45112 28
7S T/ 11W R/ 35S/ SE4S/ NE4/4 COMMUNITY SIZE (acres) __
PLOT TYPES C PLTRL 25.8 PLOT W — SURVEY AVL
PHOTOS __
DIRECTIONS --> __

CONSERVATION RANKING

COND __ Com: __
VIAB __ Com: __
DEFN __ Com: __
RANK __ Com: __

MGMT: __
PROT: __

ENVIRONMENTAL FEATURES

DL Shrub SOIL RPT —
SOIL UNIT — SOIL TAXON —
PM — LANDFORM __ PLOT POS — SLP SHAPE — ASP __
SLOPE % __ ELEVATION __ EROS POTENT — EROS TYPE —
HORIZON ANGLE (%): N__ E__ S__ W__ IFSLP — IFVAL —
SPFE —
GROUND COVER: — S+ 70 G+ 10 R+ 10 L+ — W+ — M+ 10 BV+ 1 O = 100%
DISTURBANCE HISTORY (type, intensity, frequency, season) --> __

RIPARIAN FEATURES: Channel Width — Channel Entrench —
Surface Water — Ht.Abv.H2O — Dist. from H2O —

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

OCULAR PLANT SPECIES DATA

PltIDL ____

PLOT NO. F-15 NO. SPECIES 11 PNC AGR SPI / POA SAN

TREES Tot Cv ____ MHt ____
Tal Cv ____ Med Cv ____
Low Cv ____ Grd Cv ____

			CC
T 1			
T 2			
T 3			
T 4			
T 5			

SHRBS Tot Cv 10 MHt .8'
Tal Cv — Med Cv T
Low Cv 10 Grd Cv T

			CC
S 1	Gutierrezia sarothrae	GUTSAR	1
S 2	Artemesia frigida	ARTFRI	3
S 3	Chrysothamnus nauseosus	CHRNAU	3
S 4			
S 5			
S 6			
S 7			
S 8			
S 9			
S10			
S11			
S12			

GRAM Tot Cv 10 MHt 1'
Med Cv 10 Low Cv 3
Grd Cv —

			CC
G 1	Agropyron spicatum	AGRSPI	10
G 2	Bromus tectorum	BROTEC	1
G 3			
G 4			
G 5			
G 6			
G 7			
G 8			
G 9			
G10			
G11			
G12			

FRBS Tot Cv 10 MHt .5'
Med Cv T Low Cv 10
Grd Cv 3

			CC	
F 1	Phacelia hastata	PHAHAS	3	F-11 X
F 2	Chaenactis douglasii	CHADOU	1	
F 3	Lewisia pygmaea	LEWPYG	T	F-13 X
F 4	Eriogonum strictum	ERISER	T	
F 5	Mentzelia laevicaulis	MENLAE	T	
F 6	Eriogonum microthecum	ERIMIC	10	
F 7				
F 8				
F 9				
F10				
F11				
F12				
F13				
F14				
F15				

FERN Tot Cv — MHt ____ Med Cv ____
Low Cv ____ Grd Cv ____

BRYO/LICH Tot Cv 1

COMMENTS (EODATA) --> ____

MTNHP SITE AND COMMUNITY SURVEY MANUAL

version 91B

Montana Natural Heritage Program
1515 East 6th Ave., Helena, MT 59620

This document should be cited as follows:

DeVelice, R.L. 1991. MTNHP site and community survey manual. version 91B. Montana Natural Heritage Program, Helena, MT. 24 pp.

MTNHP SITE AND COMMUNITY FORM MANUAL

Montana Natural Heritage Program
1515 East 6th Ave., Helena, MT 59620

This manual is for use in completing the 5/27/91 versions of the Site Survey and Community Survey forms. Only those fields potentially needing greater clarification are included. Definitions for many of the fields on the Community Survey Form are taken directly from the USDA Forest Service's ECODATA General Field and Plant Composition data forms (developed at the Forest Service Regional Office, Missoula, MT). See last two pages of manual for copies of survey forms.

SITE SURVEY FORM INSTRUCTIONS

IDENTIFICATION AND LOCATION

MANUAL

Enter the version number of the MTNHP survey manual used in completing this form (i.e., "91B" for this manual).

SITENAME

Each site should be assigned a unique name. A few standards in naming follow:

1. do not use element names in the site name
2. use local place names when available
3. use names of features on topographic maps when local names do not exist

DIRECTIONS

Directions to Site - enter precise directions to the site using a readily locatable landmark (e.g., a city, a major highway, etc.) as the starting point on a state or local road map. Use clear complete sentences that will be understandable to someone who is unfamiliar with the area, needs to get to the site, and has only your directions to follow. Cite distances as closely as possible to the 1/10 of a mile, use compass directions (N, S, E, and W), and be sure to specify the best access to the site, such as where to park or which trail to use.

MTNHP SITE AND COMMUNITY FORM MANUAL

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SITE SURVEY FORM INSTRUCTIONS

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ELEMENT OCCURRENCES

Under "Element Name" list all elements sought, reported, or confirmed from the site. If known, record the "Occurrence Numbers" for each. Use the "Plot Number" codes from the community survey form or generate simple letter or number codes which identify each element occurrence on the base map; these codes help keep the base map uncluttered. Indicate whether the element was found (Y, N) on the date of the site visit, and whether a return visit is needed.

SITE DESCRIPTION/DESIGN

SITE DESCRIPTION

Enter a short general visual description of the site. The description should present a simple, easily understood, word picture of the site's principle physical and natural features.

> Example: "The site is a granitic exfoliation dome of the Boulder batholith. It is primarily covered by crustose lichens. Vascular plants are rooted in rock fissures."

Comments about the biodiversity significance of the site will be generated later following review of the Site Survey and Community Survey forms and should not be part of this site description.

BOUNDARY JUSTIFICATION

Explain the biological rationale used to determine the location of the site's primary and secondary ecological boundaries. Your explanation should clearly justify why the site boundaries were drawn where they were rather than simply describing the boundaries or any coincidental property lines. Include reference to the source of information (e.g., field work, maps, etc.) on which boundary decisions were based.

PROTECTION URGENCY

A protection action may include activities such as educational or public relations campaigns or collaborative planning efforts with public or private entities to minimize adverse impacts to element occurrences at the site. It does not include management actions (i.e., any action requiring stewardship intervention).

Threats that may require a protection action include:

1. anthropogenic forces that threaten the existence of one or more element occurrences at the site

2. the inability to undertake a management action in the absence of a protection action

MANAGEMENT URGENCY

A management action may include biological management (e.g., prescribed burning, removal of exotics) or people and site management (e.g., building barriers to prevent ORV use, rerouting trails, patrolling for collectors, hunters, or trespassers). Management action does not include legal, political, or administrative measures taken to protect the site.

STEWARDSHIP

LAND USE COMMENTS

Describe current and past land use, improvements and structures. Discuss the stewardship implications of this use.

Uses to consider: recreation, dumping, agriculture, mining, grazing, etc. Discuss the possibility of hazardous or toxic waste disposal on site including reasons as to why it may or may not be a problem.

POTENTIAL HAZARDS

Describe potential natural hazards (e.g., cliffs, caves, waterfalls, etc.) on the site and indicate any precautions stewardship should take.

EXOTIC FLORA/FAUNA COMMENTS

Describe potentially damaging exotic (i.e., alien) flora and fauna (e.g., cheatgrass, leafy spurge, knapweed, feral cats, horses, etc.) on the site. Indicate their location and abundance, as well as their effect on the viability of endangered elements. Indicate also how stewardship will manage or control the exotic species and whether local ordinances require such control.

OFF-SITE CONSIDERATIONS

Describe off-site land uses (e.g., farming, logging, grazing, dumping, watershed diversion, etc.) and how those uses might affect the site, elements on the site, and management of the site.

SITE AND ELEMENT MANAGEMENT NEEDS

Summarize the expected management needs for the site and the elements on it. Include routine items such as need for fencing, restricting use, grazing, control of exotics, burning, etc.

COMMUNITY SURVEY FORM INSTRUCTIONS

IDENTIFICATION AND LOCATION

MANUAL

Enter the version number of the MTNHP survey manual used in completing this form (i.e., "91B" for this manual).

UNITS (one-character code)

Units of Length - enter "X" in the appropriate space to describe if the units of length or height being entered are feet or meters.

PLOT NUMBER (seven-character alphanumeric code)

Record in order the year (2-digits), the first and second initial of the principal examiner (2-characters), and the plot ascension number (3-digits).

> Example: The 33rd plot sampled in 1991 by Hank Gleason would be entered as 91HG033.

EOCODE (14-character alphanumeric code)

Element Occurrence Code - enter this code in the field only if it's known. Record in order the MTNHP element code (10-characters), a period, and occurrence ascension number (3-digits).

> Example: The 23rd occurrence of the Douglas-fir/little bluestem plant association would be entered as C2ABBABF0.023.

PNC

Potential Natural Community - if the PNC is questionable, make notes concerning the problem either in this field or in the "Comments" field.

CT

Community Type - in many cases, the CT and PNC will be equivalent. If the CT is questionable, make notes concerning the problem either in this field or in the "Comments" field.

SITE

Surveysite - name assigned to the plot site at the time it is sampled. In many cases, this name will be equivalent to the "Sitename" given on the Site Survey Form, except will include modifiers to differentiate this specific plot from the general site.

> Example: A plot in the eastern portion of the Block Mountain Standard Site might have the Surveysite name "Block Mountain East".

A few standards in naming follow:

1. do not use element names in the site name
2. use local place names when available
3. use names of features on topographic maps when local names do not exist

PURP (one-character code)

Purpose - enter one of the following codes explaining why the data was collected. If more than one code applies, enter "I":

F - evaluation of fire effect, fire history, or fuels
C - TES plant species habitat analysis
G - TES animal species habitat analysis
W - general wildlife habitat analysis
B - big game habitat analysis
M - range monitoring (e.g., readiness, trend, utilization)
V - correlation of vegetation with soil survey
D - evaluation of watershed erosion, rehabilitation, or cover
Z - research plot
L - correlation or classification for spectral or LANDSAT data
J - RNA and SIA analysis
E - new classification or succession study
I - integrated multi-resource inventory and monitoring
H - data to strengthen existing classification
X - other purpose not listed here

PREC (one-character code)

Precision to which the plot can be located on a topographic map is defined as follows:

S second - mappable within a three-second radius

M minute - mappable within a one-minute radius

(approximately 2 km or 1.5 miles)

G general - mappable to quad or place name precision only (precision within about 8 km or 5 miles)

COMMUNITY SIZE (acres)

Total size of the continuous community occurrence (not plot size).

PLOT TYPES (up to five-character code)

Up to five of the following 1-digit codes listing the types of forms completed for this plot:

S - Site Survey Form
C - Community Survey Form
M - Microplot Vegetation Data Form
T - Tree Measurement Form
E - Soil Characterization Form
R - Reconnaissance Soil Characterization Form

PLTRL (up to three-digit number)

Plot Radius or Length - enter plot radius (for circular plots) or length (for rectangular plots). Indicate units of measurement.

Note: a 375 m^2 plot has a radius of 10.9 m (35.8 ft)
a 50 m^2 plot has a radius of 4.0 m (13.1 ft)

PLOT W (up to three-digit number)

Plot Width - enter width if a rectangular plot shape is used. Enter 0 (numeric) if a circular plot shape is used. Indicate units of measurement.

SURVEY (five-character alphanumeric code)

Character 1 - method of locating plot. Enter one of the following:

A - plot subjectively located to represent vegetation in occurrence (typically used in inventory)

B - plot subjectively located to represent stand, and will be used to monitor vegetation change through

time with or without treatment

C - plot is part of series of replicated plots systematically or randomly located within occurrence to describe the occurrence

E - plot is part of series of replicated plots systematically or randomly located in treatment or control area to measure vegetation change with treatment over time

F - plot is part of predetermined stratified sampling design (e.g., gradsect)

Character 2 - photo taken of plot? Enter Y or N.

Character 3 - permanency and location of plot. Enter one of the following:

N - plot not permanent, the exact location unknown

P - permanent plot marked with stakes or measurements to permanent features, and location and layout are marked on map

L - plot not permanent, but location accurately marked on 1:24,000 or larger scale map or aerial photo to about 100 feet

G - plot not permanent, and location known only within general geographic area

Characters 4 and 5 - for use with re-measurement plots. Enter re-measurement ascension number (e.g., 01 for initial measurement; 06 for sixth measurement). Leave blank otherwise.

PHOTOS

Indicate how many photos were taken of the plot and any details regarding the photo(s), e.g., "One photo taken looking N across entire plot".

DIRECTIONS

Directions to Plot - enter precise directions to the plot using a readily locatable landmark (e.g., a city, a major highway, etc.) as the starting point on a state or local road map. Use clear complete sentences that will be understandable to someone who is unfamiliar with the area, needs to get to the plot, and has only your directions to follow. Cite dis-

tances as closely as possible to the 1/10 of a mile, use compass directions (N, S, E, and W), and be sure to specify the best access to the plot, such as where to park or which trail to use.

CONSERVATION RANKING

Grade the community occurrences condition, viability, and defensibility according to the following scale:

A - excellent
B - good
C - marginal
D - poor
F - terrible

COND (one-character code)

Condition - base grade on how much of the site and the community occurrence itself has been damaged or altered from its optimal condition and character. Provide comments on condition grade.

VIAB (one-character code)

Viability - base grade on the long-term prospects for continued existence of the occurrence. Provide comments on viability grade.

DEFN (one-character code)

Defensibility - base grade on the extent to which the occurrence can be protected from extrinsic human factors that might otherwise degrade or destroy it. Provide comments on defensibility grade.

RANK (one-character code)

Summary grade of the condition, viability, and defensibility grades listed. Provide comments on this overall grade, i.e., EORANKCOM.

MGMT

Management Comments - comment on any management (new or additional) needed to ensure continued existence of the

community occurrence, and chances (and means) of bringing it about. Any other pertinent comments go here as well, e.g., "... clearing of competing vegetation has been tried in the past but without success".

PROT

Protection Comments - comment on any legal protection (new or additional) needed to ensure continued existence of the community occurrence, and chances (and means) of bringing it about. Any other pertinent comments go here as well, e.g., "... landowner shows interest in taking action to legally protect community occurrence".

ENVIRONMENTAL FEATURES

DL (one-character code)

Dominant Life Form - enter one of the following codes to describe the dominant live life form currently present on the plot (Note: dominate life form = life form with the greatest foliar volume):

A - aquatic species dominate
B - broadleaf trees dominate
C - coniferous trees dominate
F - forbs dominate
G - graminoids dominate
H - herbs (graminoid/forb mixture) dominate
M - moss or lichens dominate
N - non-vegetated soil
P - agricultural cropland
R - rock or scree
S - shrubs dominate

SOIL RPT

Soil Survey Report - cite the soil survey report used to identify the "Soil Unit" and "Soil Taxon". If none, enter "-".

Example: "Soil Survey of Madison County (SCS 1989)"

SOIL UNIT

Enter the appropriate map unit symbol from the soil survey map of the area. If none, enter "-".

SOIL TAXON

Enter the appropriate soil subgroup name from the soil survey report for the area. If not known, enter "-".

PM (four-character code)

Parent Material - enter the appropriate parent material code from the list below:

Sedimentary
SETU - type unknown
LIME - limestone
DOLO - dolomite
SAND - sandstone
CASA - calcareous sandstone
SILT - siltstone
CASI - calcareous siltstone
SHAL - shale
RESH - red shale
CASH - calcareous shale
CONG - conglomerate
CACO - calcareous conglomerate

Metamorphic
METU - type unknown
ARGI - argillite
CAAR - calcareous argillite
SILI - siltite
QUAR - quartzite
SLAT - slate
PHYL - phyllite
SCHI - schist
BISC - biotite schist
MISC - mica schist
GNBG - gneiss and biotite gneiss

Igneous
IGTU - type unknown
BASA - basalt (including obsidian)
ANDE - andesite
DIGA - diorite to gabbro
LATI - latite
QUMO - quartz monzonite
TRSY - trachyte and syenite
RHYO - rhyolite
GRBG - granite and biotite granite
WETU - welded tuff (tufa)
SCOR - scoria (porcelanite), clinker

Miscellaneous
GRAL - gravelly alluvium
SAAL - sandy alluvium
SIAL - silty alluvium
CLAL - clayey alluvium
MIAL - mixed alluvium
GLTI - glacial till, mixed origin
ASHT - ash (of any origin)
MISE - mixed sedimentary
MIME - mixed metamorphic
MIIG - mixed igneous
LOES - loess
MIRT - mix of two or more rock types
DUNE - sand dunes

LANDFORM (four-character code)

Enter the appropriate geomorphic landform code from the list below:

General Landform Type	Code	Refined Landform Type
residual mountain slopes and ridges	RMTU	type unknown
	RMDS	dissected straight slopes
	RMDC	dissected convex slopes
	RMUS	undissected slopes
	RMRI	ridges
	RMDE	depressions
glaciated mountain slopes and ridges	GMTU	type unknown
	GMUS	undissected slopes
	GMDS	dissected slopes
	GMRI	ridges
alpine glacial valleys	AVTU	type unknown
	AVTB	trough bottoms
	AVUT	undissected troughwalls
	AVDT	dissected troughwalls
	AVAP	avalanche paths and debris fans
alpine glacial ridges	ARTU	type unknown
	ARCB	cirque basins
	ARCH	cirque headwalls and alpine ridges
	ARUU	undulating uplands

General Landform Type	Code	Refined Landform Type
rolling uplands	RUTU	type unknown
	RULR	low relief rolling uplands
	RULD	low relief uplands, dense drainage
	RUMR	moderate relief rolling uplands
	RUDR	dissected rolling uplands
breaklands	BLTU	type unknown
	BLDR	dissected river breaks
	BLUR	undissected river breaks
	BLSB	structural breaks
	BLSH	stream headlands
structurally controlled mountain slopes	SCTU	type unknown
	SCDS	dip slopes
	SCDR	dipping layered rocks
	SCPL	plateaus
glacial till forms	GTTU	type unknown
	GTMO	moraines
	GTDL	drumlins
	GTKK	kames and kettles
alluvial-colluvial-lacustrine forms	ACTU	type unknown
	ACFP	flood plains
	ACTE	terraces
	ACAF	alluvial fans
	ACCF	colluvial fans
	ACBT	colluvial basins and toeslopes
	ACAB	alluvial basins
mass wasted slopes	MWTU	type unknown
	MWLS	landslides

PLOT POS (four-character code)

Plot Position - enter the appropriate code from the list below to describe the topographic position of the plot:

General Plot Position	Code	Refined Plot Position
narrow valley bottom (<100 feet wide)	NVTU	type unknown
	NVSC	stream channel
	NVSB	stream bar
	NVLE	levee (narrow flood plain overbank deposits)
	NVCD	colluvial deposit (colluvial fan)
moderate valley bottom (100-300 feet wide)	MVTU	type unknown
	MVSC	stream channel
	MVSB	stream bar
	MVFP	flood plain (incl. levees if appropriate)
	MVAM	abandoned meander
	MVOX	oxbow
	MVBS	backwater slough
	MVTE	terrace
	MVAF	alluvial fan (toeslope)
wide valley bottom (>300 feet wide)	WVTU	type unknown
	WVSC	stream channel
	WVSB	stream bar
	WVFP	flood plain (incl. levees if appropriate)
	WVAM	abandoned meander
	WVOX	oxbow
	WVBS	backwater slough
	WVTE	terrace
	WVAF	alluvial fan (toeslope)
slope features	SLTU	type unknown
short slope	SLSS	short slope, neither upper nor lower (<100 ft)
lower slope	SLLS	lower slope
	AFLS	lower slope of alluvial fan (fan skirt)
mid slope	SLMS	mid slope
	AFMS	mid slope of alluvial fan
upper slope	SLUS	upper slope
	AFUS	upper slope of alluvial fan

General Plot Position	Code	Refined Plot Position
shoulder	SHDR	shoulder
ridge	RINR	narrow ridge (<100 ft wide)
	RIWR	wide ridge summit (>100 ft wide)
bench	BNCH	bench in mountainous terrain

SLP SHAPE (one-character code)

Slope Shape - enter one of the following codes to indicate the vertical shape of the slope on which the plot lies:

S - straight or even
R - rounded or convex
D - depression or concave
P - patterned (micro-relief of hummocks and swales)
U - undulating pattern of low ridges or knolls and draws
X - other

ASP (up to three-digit number)

Aspect - enter the direction of the slope on which the plot occurs (in degrees; corrected for declination).

SLOPE % (up to three-digit number)

Enter the steepness of the slope on which the plot occurs (in percent).

EROS POTENT (two-character code)

Erosion Potential - enter one of the following codes to indicate the potential for erosion on the plot:

SA - soil surface is stable with no evidence of accelerated erosion

UC - soil surface is unstable because of compaction

UD - soil surface is unstable because of displacement and/or churning of the soil

UP - soil surface is unstable because of lack of protective vegetation cover

UA - unable to assess

EROS TYPE (two-character code)

Enter one of the following codes to indicate the dominant type of erosion occurring on the plot:

NO - none
SE - sheet erosion
RE - rill erosion
GE - gully erosion
DE - deposition
WE - wind erosion
SC - soil creep
SL - slump (earth flow)
TD - terrace development
SL - slide

HORIZON ANGLE (%) (up to three-digit numbers)

Record the angles to the four horizons (in percent).

IFSLP (up to three-digit number)

If "General Plot Position" is sloping (i.e., > 3% slope), estimate distance from top of slope to upper edge of plot. Indicate units of measurement.

IFVAL (up to three-digit number)

If "General Plot Position" is level (i.e., 0 - 3% slope), estimate distance across valley or flat (passing through plot). Indicate units of measurement.

SPFE

List any special features of the site on which the plot is located (if desirable, describe these features under "General Site Description"). If none described, enter "NA".

Examples: avalanche chute, talus, seep, etc.

GROUND COVER (two-digit codes)

Enter cover class code for each of the following types of ground cover:

S - bare soil (particles < 1/16 in. dia.)
G - gravel (particles 1/16 to 3 in. dia.)
R - rock (particles > 3 in. dia.)
L - litter and duff. Litter includes freshly-fallen leaves, needles, twigs, bark, fruits; duff is fermentation layer and humus layer.
W - wood (downed fragments > 1/4 in. dia.)
M - moss. Also includes Lycopodium and Selaginella.
BV - basal vegetation. This is the area occupied by root crowns and stems, not canopy cover. Values rarely exceed 30% and are usually lower.
O - other. Use when an additional category is needed. Identify the "other" item (e.g., lichen; water).

Use the following cover classes and codes:

Code	Class	Midpoint
0	0%	0%
1	< 1%	0.5%
3	1% to 4.9%	3%
10	5% to 14.9%	10%
20	15% to 24.9%	20%
30	25% to 34.9%	30%
40	35% to 44.9%	40%
50	45% to 54.9%	50%
60	55% to 64.9%	60%
70	65% to 74.9%	70%
80	75% to 84.9%	80%
90	85% to 94.9%	90%
98	95% to 100%	97.5%

RIPARIAN FEATURES

If the plot is within the riparian zone record the following information (indicate units of measurement as appropriate):

Channel Width (up to three-digit number) - if valley contains multiple channels, give width of channel nearest to the plot.

Channel Entrenchment (up to three-digit number) - depth to which channel has cut into valley floor.

Surface Water (two-digit code) - estimate of maximum ground cover of surface water on plot during the year (use cover classes listed above under "Ground Cover").

Height Above Water (up to three-digit number) - height of plot above stream or pond surface when water is at bank-full stage (water at bank-full stage reaches lower limit of terrestrial vegetation).

Distance from Water (up to three-digit number) - distance from water at bank-full stage to nearest plot edge.

GENERAL SITE DESCRIPTION

Description (a "word picture") of the place where the sampled community occurs. (Any specific information about the plot itself should be written into the "Comments" field following the "Ocular Plant Species Data"). Consider the setting of the community occurrence in the surrounding landscape (including landscape features and adjacent community types).

OCULAR PLANT SPECIES DATA

This portion of the form is used for recording plant species data by lifeform class, i.e., "Trees", "Shrubs", "Graminoids", and "Forbs".

For all cover estimates, use the codes from the following cover class table:

Code	Class	Midpoint
1	< 1%	0.5%
3	1% to 4.9%	3%
10	5% to 14.9%	10%
20	15% to 24.9%	20%
30	25% to 34.9%	30%
40	35% to 44.9%	40%
50	45% to 54.9%	50%
60	55% to 64.9%	60%
70	65% to 74.9%	70%
80	75% to 84.9%	80%
90	85% to 94.9%	90%
98	95% to 100%	97.5%

PltIDL (two-digit code)

Plant Identification Level - enter the two-digit number that represents the percent of canopy cover equal to or greater than which all plants are to be identified. For example, "5" indicates that all plant species having 5% canopy cover or greater would be recorded; "0" indicates <u>all</u> plant species have been recorded.

Tot Cv (two-digit code)

Total Cover - estimate the percent canopy cover for the respective lifeform. This estimate is not the sum of all species in the lifeform and does not count overlap. It is the horizontal percent cover of the vertical projection of the lifeform.

Tal Cv (two-digit code)

Tall Height Cover - estimate "Total Cover" (as described above) by life form for individuals taller than 5 m (16.4 ft).

Med Cv (two-digit code)

Medium Height Cover - estimate "Total Cover" (as described above) by life form for individuals between 0.5 and 5 m tall (1.6 - 16.4 ft).

Low Cv (two-digit code)

Low Height Cover - estimate "Total Cover" (as described above) by life form for individuals between 0.05 and 0.5 m tall (0.2 - 1.6 ft).

Grd Cv (two-digit code)

Ground Height Cover - estimate "Total Cover" (as described above) by life form for individuals shorter than 0.05 m (0.2 ft).

MHt (three-digit code)

Mean Height - estimate the mean height of the dominant size class within the respective lifeform. Indicate units of measurement.

CC (two-digit code)

Canopy Cover - enter the appropriate canopy cover code listed above for each species in each lifeform.

T1, T2, S1, etc.

List each species within a lifeform using the following convention: full scientific binomial, code name (first three letters of genus and first three letters of the specific epithet), and canopy cover code (see "CC" above).

Example: T1 Pinus ponderosa / PINPON ¦ 40

COMMENTS (EODATA)

Specific information regarding the community occurrence at the site, e.g., numbers, size, condition, peculiar characteristics, viability.

APPENDIX D

Legal descriptions and habitat associations of Ferruginous Hawk nests observed in southwest Montana (1992).

AREA	LOCATION	STATUS	ASSOCIATION
Armstead	T12S,R09W,S01,SENESE	INACTIVE	SS
	T11S,R08W,S31,NENESW	INACTIVE	FP
	T12S,R09W,S35,SESENW	INACTIVE	SS
Bannack	T07S,R11W,S35,SENENW	ACTIVE	SS
	T07S,R11W,S36,SWNESW	INACTIVE	SS
	T07S,R11W,S36,SWNWNW	INACTIVE	SS
	T07S,R11W,S36,SWNWNW	INACTIVE	SS
	T07S,R11W,S35,SENENE	INACTIVE	SS
	T07S,R11W,S36,SWNESW	INACTIVE	SS
	T07S,R11W,S36,SWNWNW	INACTIVE	SS
	T07S,R11W,S35,NESWNW	INACTIVE	SS
Block Mtn.	T04S,R08W,S16,SESWSW	ACTIVE	SS
Diamond Butte	T15S,R06W,S08,NESENE	ACTIVE	SS
	T15S,R06W,S07,SWSWNE	ACTIVE	SS
Frying Pan	T06S,R09W,S20,SENESW	ACTIVE	FP
	T06S,R09W,S18,SWSESE	ACTIVE	SS
	T06S,R09W,S18,SWNENW	ACTIVE	SS
	T06S,R09W,S17,SWSENE	ACTIVE	FP
	T06S,R09W,S08,NESENE	ACTIVE	SS
	T06S,R09W,S32,NWSWNE	ACTIVE	FP
	T07S,R09W,S04,NESENW	ACTIVE	SS
	T06S,R09W,S33,SWNWNW	ACTIVE	FP
	T06S,R09W,S18,SWNWSE	INACTIVE	SS
	T07S,R09W,S05,NENESW	INACTIVE	FP
	T06S,R09W,S18,SWNENW	INACTIVE	SS
	T06S,R09W,S18,SWNENW	INACTIVE	SS
	T06S,R09W,S18,SWNWSE	INACTIVE	SS
	T07S,R10W,S01,NENWNW	INACTIVE	FP
	T06S,R09W,S28,NWNWSE	INACTIVE	SS
	T06S,R09W,S20,SENESW	INACTIVE	FP
	T07S,R09W,S03,NESESW	INACTIVE	SS
	T06S,R09W,S08,NESWNE	INACTIVE	SS
	T06S,R09W,S28,NWNWSE	INACTIVE	SS
	T06S,R10W,S25,NESESW	INACTIVE	SS
Henneberry Ridge	T09S,R10W,S19,NESWNE	ACTIVE	MM
	T08S,R11W,S35,NENWNW	INACTIVE	SS
	T08S,R11W,S35,SENENW	INACTIVE	SS
	T09S,R11W,S24,SENWSW	INACTIVE	MM
	T08S,R11W,S25,SESWNE	INACTIVE	SS
	T09S,R11W,S25,NENWNW	INACTIVE	SS
	T09S,R11W,S12,NENESW	INACTIVE	SS
	T08S,R11W,S25,SESENE	INACTIVE	SS
	T09S,R11W,S12,NENESW	INACTIVE	SS

AREA	LOCATION	STATUS	ASSOCIATION
Sweetwater	T08S,R05W,S27,SWNWSE	ACTIVE	FP
	T08S,R05W,S27,SWNWSE	INACTIVE	FP
	T08S,R05W,S27,NWNENE	INACTIVE	FP
Vinegar Hill	T12S,R07W,S28,SESESE	ACTIVE	FP
	T12S,R07W,S20,SENESE	INACTIVE	FP
	T12S,R07W,S28,SESWSW	INACTIVE	FP
Incidental	T14S,R06W,S33,SESENE	ACTIVE	FP

SS = Sagebrush Steppe
FP = Foothill Prairie
MM = Mountain Mahogany

APPENDIX E

Legal descriptions of other raptor nests observed while performing Ferruginous Hawk surveys in southwest Montana (1992).

AREA	SPECIES	LOCATION
Armstead	Red-tailed Hawk	T11S,R08W,S32,SENWSW
Bannack	Long-eared Owl	T07S,R11W,S03,NENENE
	Red-tailed Hawk*	T07S,R11W,S35,SWSWNW
	Red-tailed Hawk	T07S,R11W,S02,NWNWSE
	American Kestrel	T07S,R11W,S34,SWNENE
	Prairie Falcon	T08S,R11W,S04,NWSESW
	Prairie Falcon	T07S,R11W,S36,SWNWSW
Block Mtn.	Red-tailed Hawk	T04S,R08W,S36,NENWSW
	Golden Eagle	T04S,R08W,S23,SESENW
Diamond Butte	Swainson's Hawk	T14S,R06W,S04,SENWSW
	Swainson's Hawk	T15S,R07W,S02,NESENE
	Red-tailed Hawk	T15S,R07W,S12,NESWNE
Frying Pan	Golden Eagle	T06S,R09W,S28,NWNESW
	Prairie Falcon	T06S,R09W,S17,SESWSW
	Prairie Falcon	T06S,R09W,S25,SENWSE
	American Kestrel	T06S,R09W,S28,NWNWNW
	American Kestrel	T06S,R09W,S28,NWNWSE
Henneberry Ridge	Prairie Falcon	T09S,R10W,S08,NENENE
	Prairie Falcon	T09S,R11W,S02,SWSESE
	Prairie Falcon	T09S,R10W,S19,SESESE
	American Kestrel	T09S,R10W,S07,NESESE
Vinegar Hill	Golden Eagle	T13S,R07W,S05,SENWSW
	Golden Eagle	T13S,R08W,S02,SWNWSE
	Prairie Falcon	T12S,R07W,S20,SESENW
Sweetwater	Golden Eagle	T09S,R05W,S04,SWSWNE
Incidental	Long-eared Owl	T14S,R04W,S06,NESENE

* Krider's Hawk ♂ x Dark morph ♀